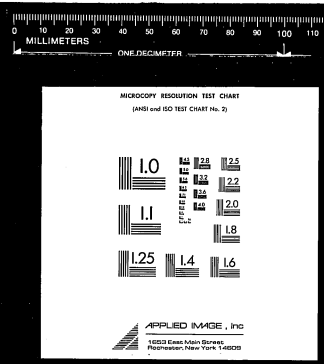

14:1

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Thomas A. Edison Papers

A SELECTIVE MICROFILM EDITION

PART III
(1887–1898)

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University Publications of America
Bethesda, Maryland
1993

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Thomas A. Edison Papers
at
Rutgers, The State University
endorsed by
National Historical Publications and Records Commission
18 June 1981

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The original documents in this edition are from the archives at the Edison National Historic Site at West Orange, New Jersey.

ISBN 0-89093-702-8.

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Notebook, N-89-05-30.2

This notebook covers the periods May-August 1889 and October 1895-February 1896. There is also one dated entry from February 1898. The first 57 pages (not filmed) were used by Jonas W. Aylsworth as a rough record book for phonograph cylinder experiments, nos. 1-28. On page 15 is an entry by Edison from May 30, 1889 entitled "first class cylinder." Transcriptions of these records can be found in N-88-08-23 (experiments, nos. 1016-1065). The remainder of the book was used by an unidentified experimenter for notes on cylinder experiments, nos. 30-110. The front cover is labeled "Book 1000." Another inscription indicates that the book was used as an exhibit in *American Graphophone Co.* v. *National Phonograph Co.*, United States Circuit Court, District of New Jersey. The book contains 189 numbered pages.

Blank pages not filmed: 166-177, 184-187.

No 3½

May 30 – 1889

(13)

1022

First class cylinder –

Not ½ scratch of Rag – make a splendid musical cylds – Very hard. will probably require Saphire Cutters, Cant be filtered well – Moulds nicely – only keenest Edges on Records Can be used on account hardness – Can track deep. works well as a Thick or thin Veneer low melting point, pours low temperature. The Cylinder I tried was filtered –

500 grammes Purified Cake Beeswax
470 grammes Carnauba
30 " dry Salt acetate Alumina

Cook well to get off acetic
Color light brick red – The end
a great lot of pineapple
alumina left, This Cannot filter to work on

Oct 17/95 (59)

Investigation of the cause of black specks in wax & the wax coming dark.

It was observed that the silver lined kettles became black.

Tests of the different materials showed that it comes from sulphur in the cocoa.

This comes from the natural cocoa, it sometimes is found in nature ~~[illegible]~~ in contact with a large of sulphur two or three times their bulk.

This sulphur is completely removed by heating to 400° with coffee turnings.

Improvement in method of making ore to get rid of the precipitated stearate of al which is a source of much dirt & much matter such as sulphate of soda & alum which does not dissolve in the water.

Tried to dissolve Al in acetic acid.
no go.

Tried to dissolve al in $KaHO_3 + Aq$.
Dissolved readily.

Wax a low new method.

Crystal carbonate soda 29.08
dissolved in 3 times its weight
of water to this is added,
after the solution gets to
almost boiling, 128 parts
of Aluminium powder
(from Pfleiming bid in Co)
When this is all dissolved
the solution is filtered hot
& quickly.
$Al_2O_3 + aq$ will separate out
when cold the solution can
now be conc — & there will
be nearly to fill in the stearic
acid.
above is enough for 100 of stearic

Rubber wax 1/4 kerosene

#31

Rubber wax vaseline with benzene

#32

Rubber wax vaseline with benzene oil added -

990 (200
900 123.7
7900
6900
9100
8400
700

900 (20
90 40

123.7
7
865.9

2000 (900
1210 2.2
2000

2.2 900 (20
200 10 45
1700 100
100

141 (200
140 20.1
100

Improved new Method of making Wax, Oct 19/95

E37

25.57	$NaCO_3 + 10 aq.$	dissolved & heated to boiling (nearly)
1.00	$NaHO$	
40.00	H_2O	

.28 fine powd'd alt added to above sol.

45% of this sol added to 100 gm stearine

20.1 gm cerasine

This will yield 123.7

If 1 gr. of soda sol should be 1,200 at 64° F

Mixt made on large scale (600 lbs)

This wax came crystalline & some stearate of alt was added which made O.K

25.5
153.0

Pg 69
but See Pg 63

First use of Aluminum in initial mixing of wax

#34 Oct 22/95

(69)

100 stearin

25.5 $NaCO_3 + 10\,aq$

1.0 Na HO

30 H_2O

.20 Al. found

Made in porcelain dish + a strip of lead foil 4 x 6" was immersed with top sticking out -

Sol. was added at 240° to 280

when ~~sold~~ solution and dried

temp run to 380°F and

10 parts crasine added (pure)

Wax foamed off to 440°F

when finished allowed to cool in same dish as it was made in.

Skin formed on surface at 324°F.

#35

100 alumina.

25.5 $NaCO_3 + 10 aq.$

1.00 NaHO.

30 K_2O

.33 Al found

Made same as #34 except
Fromed off for a longer time at 400°-420°
Cooled in same dish as it was made in.
Skin formed on surface at 330°F

36

100 stearin.
35.5 Na_2CO_3 + 10 aq.
1.00 NaHO
30 H_2O
140 al (found)
Dry cooked same as No 84
Congealing point 316 F.

37

Some liquid Reg. cooled same as # 34

Bonpoaling point = 288° F

92 (4)
23

38 Oct 2.4/9,-

(77)

Wax made in lead kettle at Silver Lake

400 lb. stearic
92 " $NaBO_3(10H_2O)$
1359 gm. NaHO
598 " Al (powd)
120 lb. H_2O
30 lb. ceresine

Wax was quite light color but was darkened some from burnt wax oozing out of tack holes in lead when the seam was made.

Congealing point = 262° F

39

Same as # 38 taken out before ceresine was added

40.

Hardening wax.

700 gm # 39

14 " linseed oil, (boiled?)

41

Hardening Wax

700 gm # 39.

40 " Raw Linseed (heated + filtered)

23
8
184

30
7
240

3
100

Variation of Reg. Oct 25 (81)

.142

100 Stannin
23 $Na\,BO_3 + 10\,Aq$
.75 $Na\,HO$
30 H_2O
.40 Al formed

No cassiri.

Stannin & Solution were double filtered.

Cooled in the dish it was made in no crystalline state at all
Very hard wax; good cut.

20	.75	.50
8	8	8
160	6.00	4.00

20
3
240

#43

100 atomic.

23 $Na_2CO_3 + 10\,aq.$

.75 $NaHO$,

.50 Al foil

30 H_2O

100 cocoanut

Stearic & Solution were double filtered.

#44

no alcohol
24 $NaHCO_3$ + iong
.171 ~~H_2O~~ ~~at found~~
.32 at found
no cocaine

130
9
1170
234
22
266

8
3½
4
24
28

#45 — 10/28/95 (87)

350 gms #42
21 " Thin paraffine oil.)

Congealing point = 130°C.
266°F

Hardness.

#46
350 gms - #42
28 " - Filtered raw linseed

#47 10/29/75 (89)

Made at Silverlake

100 Stiene
18½ $NaCO_3$ + 10 gg.
11.5 NaHO
30 H_2O
35 al
10.6 Benzene

#47½

Made at Silverlake 11/5/75

100 Stiene
23 $NaCO_3 \cdot 10H_2O$
19 NaHO
31 H_2O
35 al
21 Ben

122
9
1098
119
22
2571

125
9
1125
225
32
257

4×3
9

23
2
23

.75
9
675

#48 10/30/95

made in an Aluminium Kettle -
Wt of Kettle before = 336.75 [illegible]
" " " after 10 hrs = the same.

Steam and	100	× 9	=	900
Na_2CO_3 10 aq	23	× 9	=	207
Na_2HO.	.75	× 9	=	6.75
K_2O	30.	× 9	=	270
al —	.40	× 9	=	3.6

no amorphous.

congealing point = 257° F

#79.

Moisture test.
A lot of different cylinders among which were some regulars and #40 - 41 - 45 & 46 were put in box heated to 110°F with two samples in box over which was a pan containing water soaked moss.

Put cylinders in 9.00 am 10/30/95.
Two offered offset at 8.00 am - 10/31/95.
Graphone cylinder put in 9.00 am. 10/31/95.

at 8 AM. 11/4/95.
Reg wax was unaffected.
#41 very dull, #42 also dull.
#45 slightly affected #46 very dull.
Graphone not affected.

15
10

#50 11/4/75 (95)

400 gem. # 48
60 " Jahlend now linseed.

51 11/4/95 - (97)

400 gm. # 48
32 " byhindin oil.

#52 11/4/95

Test of aluminium bottle.

100 atomic
23 $NaClO_3$ liq.
1 NaHO. (pure made) } × 10
40 al.
35 H_2O.

Started adding solution at 130°c frained off to 195°c.
Turbidity began to come at 170°c & when finished it was almost perfectly clear. Very light color. Congeals at 123°c or 253°F

#53

Same as above made in porcelain dish. The solution was all made together & divided into two equal parts.
Made same as #52.
Turbidity was noticed about same as #52 & left about the same.
Very light congeals at 123½°c or 254.3°F

23
30
460

460
20
8
700

35
30
700

123
2
1107
2213.4
22
2235.4

1235
9
1111.5
2223
22
2543

My conclusion from observations of #52 & 53 is that aluminium (cast) bottle is O.K. without any doubt.

#54

350 gm #53 + 52 mixed
24½" cylinder oil.

#55

350 gm #52 & 53
17½ " crosine.
140 " cylinder oil.

#56

350 gm #52 & 57.
73½ " crosine.

57

350 gm. # 52 & 53

~~28 #~~ 28 " vaseline

58

Moisture test on # 52 - 54 - 55 - 56 & 57

Put cylinders in box Sat A.M. - box kept at 110° F. till 12

then from 5 to 12 Sat night

then from 5 P.M. Sunday to 8 A.M. Monday morning

All were affected so that they were not shiny but # 52 was the least affected.

#59 11/11/95 108

Moisture test.

#52 - 54 - 55 - 56 & 57.
the same cylinders as were
used in #58. were turned
off & put in box again
also #1 regular (see #38)
(box been made about two weeks)

#2 Regular (see #47)
(box been made about 1 week.)

#3 Regular - (see #47½)
(cylinders fresh molded 11/11/95 - a.m.
#60

#60 11/11/95

(107)

350 gm #152

24½ " Rosin oil.

1300 : 90 = 2900 : 2

90
2900
1300
1300
1300

100

5000 [illegible]

[illegible]

2.5

New Solution. 11/15/91 (111)

#71

50 gm NaHO

38 " Al shot.

400 cc H_2O
stock of Fenousin.

All dissolved completely.

Solution filtered out light.

[illegible] 3

Did not separate out after standing 3 days (or 5 days)

6.5 cc = quantity for 100 stroms

2300 : 2170 = 100 : x

1200
2600
13
15%

217000 | 2300
20700 | 94
10000
9200
8000

11/12/95 (113)

Manufacture of Stearic Acid.

2300 gms beef tallow.
Melted down & strained.

yield of pure tallow = 2170
" " " " = 94 1/4 %

1000 gms of above saponified with NaHO,
Dissolved & precipitated with H.Cl.
~~15~~ 7% NaHO, = 130 gms
Wt of fatty acids 994 gms.

~~39~~

1500 gm tallow,

150 " NaHO in 500 cc H_2O.

NaHO added while tallow is very hot about 350° F.

In order to get all NaHO in wood last time fusion allowed to run 4 600 cc H_2O added. Mass fusion finished by HCl.

Fatty acids produced =

#75 11/19/95

(115)

570 chloride sulphur added to Olive oil cold - stirred well then heated to drive off HCl. & when it began to color, saponified with NaHO solution. Result an oily oil containing both chlorine & sulphur.

76. 11/19/95

(177)

Sterne 1000 gm.
NaCl 230 "
Sol # 71 65 cc

71 was molded when temperature was about 300.
The ~~was~~ cause Thought which did not entirely cool off.

77

76 molded but mold cooled with wet rag cow being taken to around getting water on cylinder.

11. A blank for the Business machine as made and sold by the National Phonograph Company, and I have marked the same "Defendant's Exhibit Business Phonograph Blank -

78

76 molded [illegible] mold cooled with wet rags allowed motion to get one cylinder -

79

76 Molded one very but shell mold cooled by metal shell no moisture to speak of on the shell -

80 11/20/9

(121)

76 - 100 gm
Tallow. - 10 "

Molded in warm mold, core taken to beef was from water when cooling with wet rag.

81.

same as above except cylinder was allowed to get water on inside

82

Same wax as 80 molded in shell mold with very hot core cooled with heavy shell ice cold no water on cylinder.

#83

Same as 80 colored pink.

#84

Same as 81 colored pink.

#85

Same as 80 marbelized.

#8C 11/25/95

(125)

1000 gm stearic
210 " Na Bz.
70 cc #71 sol.

#71 added while stearic was just melted (about 170 - 175°F) was made slowly.

Did not become so turbid but there was slight turbidity some when first cooled.

The wax came partly crystalline.

The yield of wax was 1025 gm

15 gm $NaBO_3$ added

also colored pink salmon.

Congeal point = 131°C. = 267°F.

2170 gm refined fatty acids –
10 " Iodine

Heated in lead lined sealed iron pipe (5") to 520°F
took about 3 hrs to get to heat
then it was held 1/2 hr &
shut off at noon heat run
up again about 2:30 started
got to 520 at Blower
shut off temperature 490°)
Sample taken showed that
the Iodine had combined with
the lead leaving white iodide of
lead in the stuff.
Fatty acid only slightly hardened –
lead vessel will not work –

520
2:30
2170

88 11/22/9 (129)

Suet tallow melted & mixed with a little benzine this is allowed to get cold & is squeezed in bag the absolute wax melted & cooled off with water to remove the benzine.
Result a much harder substance no marked crystalization
hard enough for 20 lb to the 100. in wax.

23
115

89 11/22/95

Our turbid sitty. (131)

500 gms triple filtered alcohol - minutes turbidity as above.

1.83 / 115 | gms $NaCO_3 + 10 aq$ -

Turned off & observed. Was quite clear after adding the $NaCO_3$ & leaving off. Perhaps slightly more turbid than the alcohol alone.

.5 gm NaHO dissolved filtered & added to the above. Turbidity very perceptibly increased but in good light the bottom of a white dish was visible through the dish full of wine.

I would say that this is less turbid than any of the lots of wine previously made.

2.5 gms stearate of al added. Turbidity very largely increased also in pouring off the clear liquid.

On Turbidity.

100	alumin	× 12	=	1200
23	Na_2CO_3 10aq.	× 12	=	276
.9	Na HO	× 12	=	+10.8
.38	Al (chemically)	× 12	=	4.56
7.02	H_2O (distill)	× 12	=	77.
30	H_2O for the carbonate			

Wax come pretty turbid
Some was filtered through
filter cloth & it came quite clear.

The cause of the turbidity
is, the SiO_2 contained in the
aluminum dissolves in the
hot soda solution & when
the wax is made from this
solution the SiO_2 is precipitated
This is not the case when
the Aluminum is dissolved in
the carbonate of soda solution.
bycinder melted with new mold
with freezing mixture.

91 11/23/45

(120)

Softener:

2240 gm strained tallow here
400 " kerosene mixed with
it while still fluid.

This is allowed to congeal
one night in cool room —
is then pressed in filter
cloth bag under screw press —
yield of hard stearin =
before evaporating 1450 gm.

92

Lifelumen

Some tallow which was melted down & skimmed was pressed cold.

Obtained 455 gms solid
" 232 " oil

The solid was remelted & some gum benzoin added to scent it & a little bit of silicate of lime to change the appearance. it was then skimmed or filtered —

000042

2370 + 2200 = 5170
130 + 200 = 330
120 + 0 = 120
50 + 80 = 130

2370 : 2 = 400 : 9.
40
9470
2000
1470
1200
2700

93

455 gum 490
45 " # 92

94 11/27/95

Oil for molding -

2370 gum 25° Paraffine oil
237 " Stearic oil,
50 " Gum benzoin.
200 " Rosin oil (2nd run)

boiled two thick & refry
Half was poured out & as much
paraffine oil added.
Film cooled & skimmed.

95

Oil for washing

2800 gms paraffin oil

210 " steam. spirit

80 " benzoin

95
7
245

4

1500 | 40
120 | 37.5
300
300
200

96 12/7/95 (143)

Solution

23 Na CO_3 $10H_2O$ × 40 = 920

.9 lb. NaHO, × 40 = 36.

.40 al. #24 shell × 40 = 16.

31 H_2O × 40 = 1400

Divided in 2 parts + the al added to each of 2 qts

#1 Heated all dissolved at 11 cc

#2 Cold " " " ? was all dissolved Monday morning, 9th

#1 solution had only ⅓ so much residue as #2.

Hence the colder the solution while dissolving the better.

Both lots mixed made 1500 cc

Hence 37.5 cc to 100 gm stearin to make wax.

#97 12/10/95 (145)

1600 gms lactofilined stain
600 cc of #96 solution
Yield = 1660 gms.

#98.

Some of the above colored with
a little Saffanine aniline.

2050
2100
1900
4100

15200 : 330 · 6000 : x
6000
1980000 (15200
15600 370
42000
6,600
4100

V. Oil for Melting. 12/12/95 (147)

6000 gm 25° Paraffine oil.
380 Stearic oil
150 Benzoin.
150 2nd sum resin oil
The resin is added after melting of stearin.

000047

Manufacture of Picric Acid.

12/3/91

700 grm. fresh tallow,
42 " cresoline.
56 " NaOH solution 1.352 sp. gr. = 26% NaOH

This lot could be pressed but not very easily.

000048

600 =

27.48
598
21974
24732
19740
114.32916

550 : 600 = 10.16

6000 (52)
550 (1147)
750
550
2250
2100
1500

138
132
132
6

164.05

164.32

171.92

138 : 2 = 172.5 164.5
138
13160
4935
1645
22701.0 | 172
172 | 132.
510
516
341

Testing Carbonate.

200 gms $NaBO_3$ aq sample has been used in experiments.

400 H_2O.

Dissolved in a closed bottle

Gravity by weight + measure = 1128 @ 62°

New lot of $NaBO_3$ aq.

200 gms $NaBO_3$ aq.

400 H_2O.

Gravity by weight + measure = 1105

Lot tested 3/13/96

200 gms $NaBO_3$ aq.

400 H_2O. Sp. Gr. = 1142

made 525 cc.

37.5
14
15.00
.75
6.25.0

#99. 12/16/91

1400 gms Stearic a. from Gross
of 73 Murray St N.Y.
price 8¾ ¢

625 cc #96 Sol.

#100

500 gms of #99
75 " " Oleo stearine

Sterate of Al.

Determination of the Al_2O_3 in the reaction product from Silverlake.

100 gm Sterate gave 11.15 gm Al_2O_3

Manufacture of Fluoric acid. (157) 1/2/96

200 gms distilled bro chromine
13 " NaHO powder -

Tobacco. 1/26/96.
Sunday.

10 5 —

20 gms $KClO_3$
40 cc HCl.
4000 cc H_2O.
Some #35 light color + some
#32 very dark leaf put there in.

#106
40 gms $KClO_3$
80 cc HCl.
4000 cc H_2O
Some #35 light color +
some #32 very dark leaf put
there.

Tobacco 2/2/96

(161)

107

27 gm $KClO_3$ -
54 cc HCl.
1800 cc H_2O.
Some. # 32 + # 35 Tobacco.

108

54 gm $KClO_3$
108 cc HCl.
1800 cc H_2O.
Some #32 + #35 Tobacco

109

108 gm $KClO_3$
216 cc HCl.
1800 cc H_2O.
Some. #32 & #35 Tobacco.

Tobacco 2/2/96

(163)

#110

216. gm. $KClO_3$

400 cc HCl.

800 cc H_2O.

Same #32 & #31 Tobacco.

Testing Wax.

3/17/98

This wax was experimented in moulding by Sinclair commercial method to find the mould.

Congealing point of one of the cylinders = 278° F

Congealing point of the wax from which it was made = 264

2/27/98 (165)

Trouble was experienced at the Phoenix. The wax [illegible] cylinders, only about 25% came OK.

[illegible] left into the wax in the melting [illegible]

Some new [illegible] was 298°. and the congeal [illegible] was 278°. This is higher than should be. It should run [illegible]

3% stearic acid brought the congeal point down to 276

Limit of % stearic acid [illegible] congeal point to

There was no foaming [illegible] the addition of stearic at 320°

17
15
159
16
212
159
12.31

15.50
7.50

11.

87.5
5
49.90

873
45
921

101.62
878
1382
878
5040

1877
11.5

11.5
10.2
1.03

90.00
288
2

921
9

11.50
1.83
16.32
15.97
101.62

flux 700 lbs. @ 9½	=	66.50
$CaCO_3$ 200 " @ .30¢	=	1.83
al 1.9 " @ $2.00	=	3.80
bee. 146 lb. @ 11⅔	=	16.97
365		87.10

Quantities in Number 10.3

" " Old wax 11.5

700 @ 13 —

91.00
1.83
1.50
16.79
111.12 | 12.8
86.5
2462
1730
7320
40

1.9
.20
1.520

146
11½
73
146
146
16.97

91.
1.83
1.50
94.33 | 719
719
2243
2157
860
4
23

29.06
13.1 | 7
203.42
1.9
1.27

203

1

146
11½
230
91
146
146
16.97

1.9 al
2
3.8

700
4
23
146
878

878

89.10 | 878
878 | 10.2
130.0

3/13/45 (173)

600 lb. [illegible]
136 " oxyiodid
2750 lb HO
1090 #1

} as mixture below #4.

~~Sol to be made~~ 3/10/45

600 lb.
135 " $HaBO_3$
2750 lb HO
1035 gm #1
120 lbs. cu.

1800

2000

Notebook, N-89-06-19

This notebook covers the period June-November 1889. Most of the book was used by John V. N. Dorr for notes on ore analyses in the chemical laboratory. There are also entries by Dorr regarding phonograph battery experiments and notes from Reginald Fessenden to Dorr relating to ore milling work and the cleaning and physical arrangement of the laboratory. The front cover is labeled "John V. N. Dorr #553." The book contains 79 numbered pages followed by approximately 100 unnumbered pages.

Only the material by Fessenden and the notes on phonograph battery experiments have been filmed.

The following experiments.

~~1. Analysis of Gold &c~~

If you will fuse bottles with the following ores,

1. Ores Cliff
Non Mag of Mr Cliff
Mag of Mr Cliff
~~Non Mag~~ Non Mag of Mr Cliff Non Mag of C.
& Mag of Non Mag of C.

~~If~~ I treat the ore thus,

Original ore. Por. 120 grains.
separated by magnet.

2/3 Mag.

1/3 Non Mag.
Fused in crucible. & separated
Mag. again into

1/3 Non Mag.
Containing all
Clifton. Cell Tins
A. Cliff

2/3 Mag. containing
all Rich'd
Cell Tins B. Cliff.

I found A. entire ores etc as in annealing Clifton
& opt. Clifton matter

I found B. with ores only & all gold matter, without any
trace given which seems to be a perfect solvent.

Original ore Richer. ie. Ores &c.

Ground to 120. Roasted in muffle till Mag.
& Ho tree of sulphur given off. then
separated magnetically into two parts.

Mag.
Contains all Ron
& Rich'd B Rich
~~Thus~~ gains
all richest matter

Non. Mag. A. Rich
Contains all Cu.
& Iron gives all
~~richest~~ Cu. matter.

Make following analysis Ulbersm.
1. Use deep or large crucible. & bis with hole
in it. Not Pipe as I find it blows out
the richest sometimes.
2. Use ~~not~~ boil of Ammon. part of Rich'd
but water till acetic is added to then
boil long enough to acid.

3. Placed, as thoroughly
4. Single crucible and time before heating,
Beginning equal with three equal pieces. Always
duplicate. If I don't again always by again

1. Envelope Miss Cliff
2. " Mrs
3. " Mrs Mrs
4. " Mrs & Mrs (Cliff)
5. " Mrs & Mrs. (B Cliff)

6. When title broke, how I do sing & crucible. If (Ro.) (C) Just give you the crucible & covered. It is worth to stay. When the plate & crucible, it very much faster. Tell Mr Bolton & order it for good. C. Upton & him that you will have a good many buckets to grind up.) Separate image entirely very carefully. Rinse & the rest, will show you how. When you cast it for separate again. Then with Q Cliff & ~~quite~~ I not high temperature for 1 hour with equal. 1/2, 1/4 & 1/4 ~~[illegible]~~ spare

5. Placed. See which form buttons at bottom
4. Weigh & weight them to see if all copper is in the button that goes in the one you put in the crucible.
7. Mix dirts with B Cliff & see if all nickel is recovered in buttons.
8. Crush in v & weight. Do the same One, Label every thing, & have E Upton analyze all buttons outside on account of gas & lead.) Separate image entirely
4. Please A Rich & A Cliff
9. Mr B Rich. I want to get the proper proportions of sand for the nickel. About care so much for the ~~[illegible]~~ copper. as I know I can work that all right
~~10~~ If Richards comes don't tell him anything except that you are getting good results. I know the Mr E Upton get accurate. I want that one, only that I do it. Magnetic roll, Nickel Thousand
10. I also ~~[illegible]~~ Mrs. Cliff want to see you & see how much you can leach out with water. Mr Cliff,

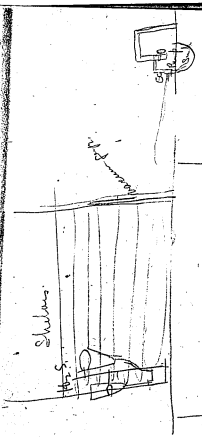
11. Get a very small fireplace with a small chimney & fire [illegible] one from Nickson & another making spirit lamps by heat & capillarity.

12. Get some stand up seat as pain. Get wood plate for stand bath to get the [illegible] to turn up as pan as [illegible] brick that will not burn [illegible] keep the plate from sinking.

13. Obtain the B. & Tables to clearing up an unsightly [illegible] it would be better to put all bottles, pots, etc. every thing in its room, behind, [illegible] bottle house, issue [illegible] to, before [illegible] to them. When [illegible] can be [illegible] to unit put every thing in [illegible] again.

14. Take small anchor & put in Balance room. [illegible] would be.

15. Take the S quantity from table when it is & put it on a table when you fill put T on greater [illegible]. See next page.
Take everything off that table except H quantity



Perhaps requisite [illegible] to put a [illegible] pump + T. [illegible] do every thing [illegible] to [illegible] 1 S & H put [illegible] in [illegible]

Anal 34

2.g. F Cliff B. - H. - Bot 13

~~Sol~~

Zn & Zc - 2.1

Cu. - — ' - 1'

Ni - Bot 9

Titration

9.0
0.25
765
93
2715
3165
2|84165
4.20

In Estimate

27225
21168
70
1.5
68.5
034.2

Cu 4.209.
Ni 3.429.

8/30/89 Battery Experiment 45

for Mr Keveley

To make Phonograph battery reverse without deterioration.

Battery No. 3 (4 cells) from Lecture Room.

Copper oxide plate covered with metallic Copper

Zinc plate eaten away.

9.30 AM Passed 3.6 Amperes through 100 volts circuit

2. P.M. Copper on oxide plate partly oxidized to down oxide. Copper deposited on Zn plate deposits unevenly collecting on the edges will probably make short circuit

4:30 P.M. Copper nearly off Cu. plate. ~~Very porous~~ deposited more regularly on Zn plate

11. P.M. Copper nearly off most persisting on side of plate facing other cells ~~Zinc~~ deposited very granular & porous mostly on plate facing from other cells

Saturday 12. M. All copper off except on edges of plate.

Scraped off deposit from Zn plate Soft grey easily detachable washed. Dried

Had run 23½ hrs

½ Cleaned off both plates amalgamated one Started current 9 A.M. 2/3 5-lamps

Analysis of Fluid for Zinc

15th fluid in E & Y

~~E~~ Neutralized by + made acid by HCl Passed H_2S through ~~Sulphide black precip formed~~ & then part of Zn precipitated. filtered washed dried

E in J. Y in A

Wt of oxide 1.333 g.

Result. Only finished approximately Each 15th fluid contains between 1 + 2 grams Zn as Zincate of Potash

Notebook, N-89-06-21.2

This notebook covers the period June-November 1889. It was used by Reginald Fessenden and Alex W. Brigham for notes on experimental projects and various other tasks in the chemical laboratory. There are also entries by Fessenden regarding structural alterations made to the chemical laboratory. The front cover is labeled "Alex Brigham #555." The spine is labeled "93." The pages are unnumbered. Approximately 50 pages have been used.

XE-172 N-89-06-21.2

#555

M. Fessenden

June 21-89

F. H. Bugbee

June 21, 89.

4 grams [illegible] in 1 c.c. also the acid & [illegible] 1 of [illegible] 100, add & heat in 4 or 5 hours with 1. alcohol. 2. CS$_2$. 3. Impure [illegible] ~~& [illegible]~~ filter & wash filtrate down [illegible] mass.

Get shell iron for stoves, furnaces etc.

Jun 22

A Ammonia for iron etc. ✓

B Find out what Hall's alloy was for free cole in charcoal. ✓

C Get shell iron cut out & worked. ✓

D Dissolve some NaOHO in CS$_2$ ✓

E. 7 mch. coal, ~~[illegible]~~ steam & SiO$_2$ ~~[illegible]~~ in 2 dish & 2 Na HO in mch. ✓

F Made samples of [illegible]

1 Clay to 1 Pond Brick

1 " " 2 " " 4 "

A [illegible]

June 22nd

A [illegible] Pb(NO3) [illegible] Tray Dice and Steam
[illegible] 5 lbs NH4Cl 10 [illegible]

B [illegible] 1 lb [illegible] in least quantity
[illegible] 10 lbs NH3 in 10 [illegible]

C [illegible] 1 lb [illegible] with 1/2 lb [illegible] OH.

D Get [illegible] of cells & [illegible] in pieces as big as 100 grams except [illegible] & also [illegible] of charcoal [illegible] 5 feet.

E. Hello

A going on Paraffine [illegible] renewed
B. OK
C OK
D OK
E
F - OK.

24th

A - OK [illegible]
B - All mixed ready to boil
C OK
D - OK
F - ~~[illegible]~~
Chlorine generators going all day no [illegible] of yet

June 25.

A. Dissolve Peanut soap with dil HCl. Take fatty acids & let them drain & give a fatty class.

B. Try Edison's idea again. 1st for 10 minutes, 2nd - 20 min. 3 for. 30 min. 4 for 1 hour, filtering & with CS, nothing could time as soon as you have finished.

C. Take oil, heat to 100 & distill the Paraffin & melt it & compare by melting point.

D. ~~Distill~~ Take 5 litres dimethyl sulphate & pass gas through cold.

E. Take 50 litres Benzoic acid & permanganate put & heat away in bottle for fortnight. Bottle & bottle cold & dry in oven. Test benzoic acid.

June 26

1 A. Throw away peanut soap & stearic acid & repeat, weighing 5 lbs of oxygen not same.

2 B. Repeat Edison's idea. & telling me each time before you pass the gas through & cooling better after each time.

3. C. Get box cells from Thomas Noble.

4 D. ~~Distill~~ fire 5 litres of clay sample to the best.

5 E. Try permanganic acid (Water through Castle oil ~~[illegible]~~ 410 minutes.

Wm.

6/25

A. ~~Brought~~

B. 1st 2nd + 3rd OK

C. OK.

D. Going on

E. ~~[illegible]~~

a. Not finished

B. Not Finished.

C. OK

D. Not Finished.

E. Not Done.

E Put 1 lt qts & green lamp cord & rest of cabinet on back column.

F. ~~[illegible]~~ Fill & Tumble with water & int. each of them pot = help a as I have a bouncing matter bottle thing

E. Make up fluoride solutions. 10 l. in tumblers

H & F put some chains & strong paper in H Fl qts.

$1. 2. 5' & rest.

June #27

~~Subject~~ Finish work for June 26.

I. Try classic cin without cylinder of calcium tube with catch for water. #5. 10. 30

June 28.

A. Put strong paper in Fluoride solutions.

B. Try classic with 2nd and of other dr. & shake starch up first.

C Fire day bells.

E ~~Sub~~

F ~~Sub~~

G ~~Sub~~

H. ~~Sub~~

28

H done ✓

O OK ✓

F OK ✓

E OK ✓

D. OK ✓

B. OK ✓

Sub's one.

OK

Sub done!

D. B otte ulmic acid & put part in Ammonia.

E. ~~Treat a little~~ Dissolve a little in ammonia & evap down in vacuo.

F. Filter crystals acid.

June 29

A. Put H2O2 in Ed. Gum che & stand up.

B. Tow shake ether & with castor oil & with Olive oil. stand stream for ~~hour~~ two minutes. of ether down. Then it will right up. in run Then half run. we cross of stands always. Tests positives as much as poss. c

C. ~~Filter up~~ Crystallize acid in pen & ~~water two~~ see if it ~~separates~~ Tiny.

N.

OK

half done.

OK.

OK. two minutes.

~~June~~ July 1.

1. a. Wash up of chlorine.

4 B. Tray clean in an Iron vat for ½ min. then till it strongly heated, then cold water.

3 C. Fuller's linseed soap & wash either over weak bath in stream of CO_2

2 D. Wash up. Sperrin 100 oz

Boracic acid	5 oz.	11 X
Ammon alum	5 "	2 —
Soda alum	5 "	3 X
Ammon Carbonate	5 "	4 X
" Chloride		5 X
Tartar emetic		6 —
Barium chloride		7 —
Copper Sulphate		8 X
Mercuric chloride		9 X
" cyanide		10 X

~~1/2~~ a. 0/6

B. "

C. "

D. "

E Made Recovery and soap.

July 22nd

A. Any class is cut with caustic till heated & then cool

B. Evap. [illegible] from skin, in [illegible], since also how [illegible]. Hand Test.

C. No examples of fire clay.

D. Dry up room 3 & room outside

E. Boil the bits for two hours in caustic soda, then wash in water, & put in HCl 1 pts. When 1 pt. water 10. When tests ok & [illegible] will till probably. Wash to neutral point. So must be very clean & bright.

July 2nd

A - OK

B -

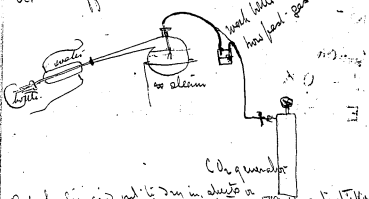
C - OK

D - OK

E - Boiled in Alkali

July 3rd

A. Boil 15 ethan stems.



B. Pt. [illegible] gas pot. is sig in. shute to [illegible] stems [illegible] food. Passing air through [illegible] to gelatin stillage
B. Try electric air for well then elec. d. heat up. Thin hot & help passing gas [illegible] for [illegible]

C. Air only Kept passing gas in for 5 min.

D. Still hot for three hours.

Blank on electrify calcium tube in any of these

E. Finish water.

F. Pass enough through solution.

A – OK
B – OK Brown
D – NO
G – "
E – OK
F

July 5th

A. Fill Chlorine Generator. — Done.

B. makes solutions on Saturday

1/9 Sodium Chloride

" " Carbonate — Finish

" " Sulphate

" " Soda.

" " Potassium

" Borax

C. Try Ulmer oil for electric same as yesterday. — Not done.

D. Fill chlorine generator & connect to to all bottles — Done.

E. Gives up 5 lbs Cal. Theale. — Not done.

July. 8.

A. Grass wp. C. 4.1. 12 Ds f.t.

B. Yr Sine ok. to divide. some so early.

C. Very poor solutions for mixture.

D. Inconvenient steps in exam.

E. Heat day bells already in most f.t. i well det.

F. Ivy and a few or 2 Ds.

July 10

A. Ty divide with Sine ans.

B. Wks Sol. 1 ll, Ammonia m

C. Examin test tubes. & put some all.

F. Put through that was in H.Q. to Dr & Mrs
put in Chlorofom & chloral. t' ex of Dr Dos Rios.

G. M.T. qtr

A Wrong

B Wrong 4 g Chlorid. 5 cwt 10 water L. @ 150 cc Dim ad.

C. —

D. —

E. Heat day seems the best

F Wrong, —

July 10

A - OK. —

B -

C. -

July 11.

A. Make up solutions.
1. Sod. Carb.
2. Barium Carb.
3. Bicarb. Soda.
& electrolyze.

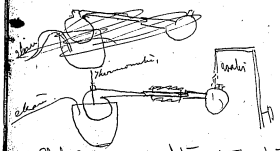
B. Chlorinize 2 lbs Paraffin.

C. Try distill air again.

July 18.

A. Freeze liquid air.

Best Goodness.



& effect what comes over between temperature of air & F.O.F. 80-100. 100-150. 150-212. 212-

A Done

B Done

C. Done

July 23

A) Make soup for Ch. Gen.

B) Clean Rooms

C) Pulverize some charcoal and [illegible] some

D. Boil down some Gem Wells

E) Take flasks etc out of Chromic Acid Wells and put in the fresh ones

F) Fill up Steam and Solar Tanks

G) Pulverize some New Ore

July 23

A) Done

B) Done

C - Done

D - Done

E - Done

F - Ad done

G - About 6th

July 24.

A. Trickle up all not very expensive solutions.

B. Also of Sodium Chloride & from Potassium Iodide also in 3 tubes

C. Grind up 5 acid from stoccoma & also of dissolved & found of.

D. Saponify chloric acid with NaOH

July 25

A. Sodium wires off & heated. Burn. Put fresh wire in & leave for week

B. Saponify chloric acid. Heat - cool & hold then pour in Ether and.

C. Saponify chloric acid. Do same to Iodic

D. Test sulphur & see how pure as hot through it.

E. Break up all like to 1" pieces & conform

F. Varnish & O through some Carbon

Sm

Sm

Sm

Sm

A Done

B

C

D

E

F Done

Final Survey [illegible]

A. [illegible] awarded units Neat & quality [illegible]

B. [illegible]

C. [illegible] chronological [illegible] e. [illegible]

D. Pat. Sulphate Cu. [illegible] in class. [illegible]

[illegible] Ursalic [illegible] till readers [illegible] paper [illegible] & pat. [illegible] [illegible] in pat. [illegible]

E. Heat [illegible] in [illegible] [illegible] [illegible]

[illegible] sulphur in [illegible]

J. Stone

C. Stone

F. Stone

E. Stone

Finish all work in Room 3 upstairs, except of course when necessary to do it downstairs. Keep up Room 3 as neatly as you can.

1st Clean all shelves. Dust them off. Put everything in order.

2. All iron apparatus that is rusty or otherwise not in good condition, repair, varnish or paint.

3. Paint inside of hood, & see that burner up chimney works all right.

4. Wipe off all bottles & see that labels are all right.

5. Prepare 1 quart of marking ink (p. 200. Chem. Rec. Bolt) & put away in bottle. Use for labels &c.

6. ~~Take the carmalose pot & brush. Clean pot.~~ Take quart bottle & brush, small. & fill bottle with shellac in wood spirit. & pass brush through tightly fitting cork, so.

Also for coating labels.

7. All things got from storeroom must be got through Mr. so that can enter them in his book.

Do all these experiments in the order I have put them down in mind on before going on to the next. That is iron wire must be finished, that is the most important. Yes & so it will probably be which we avoid.

Sat July 26

1. OK
2. "
3. "
4. "
5
6 OK
7 OK

8. 9. ahead written omission giving iron wire experiments.
I think the best will be. Use all these experiments in letter. If you get good results from the first wire or rod. Nothing but. A good result. Nothing but. ~~A~~ good result. ~~A~~ good result. ~~A~~ good result

12a. Fill ~~the~~ gas blow pipe. If gas supply is not in least quantity in water. When gas is on to tell him to prepare it for fresh by exhausting & boil away, but not to dilute. When dilute it is ready to only allow it to be put on the ~~[illegible]~~ fresh, do not heat it at all but put more wine in it & heat, were gas hot till fresh forms on wine, then take wine out & heat gas hot in air. If it is not still, heat gas hot in centre air ~~[illegible]~~ before heating in wine oil.

13. Present all ~~[illegible]~~ tin canisters up stairs & see that the labels are clean. Fill up all pressure bottles etc.

14. Fill brass mortar for all three labs.
do — — — kg. nitro glycerin in small bottles
also put glycerin in alphabetical order.

15. Go through all drawers throughout, put all stuff that the men cut in tin cans & boxes & label.

16. Make special shelf for all chloroform products put in dark bottles & label well.

17. Clean out chloroform generators in room 3. very dirty. be careful about glass tubes etc there. Nothing must be left on the floor. Room in difficulty operations after cleaning it.

18. Fill in water with stuff so that it doesn't leak.
& fill crucibles with stuff for ~~[illegible]~~ cleaning dishes
1. Dry. 2. HCl. 3. Distil water put. 4. Burn off it.

12a OK
13 OK
14
15 OK
16 OK
17 OK
18.

19. 3 in up steam ~~[illegible]~~ sulphur 3 ft flow.

20. 7 in up all ~~[illegible]~~ empt. 3 also on shelves. Have that been stuff in them & pleasure. Keep. Those that are 3 into out. 2 on shelf. Throw away or clean. ~~[illegible]~~.

21. Pull 2 steam bottles from autoclave room to the rubber connections. 20

I have spoken to Mr Ott about cutting them keep steam stuff. If he has rubbers above, put it in place of one of the bottles.

22. 7 in up connections to Wilmington gauge. Up on that then both disconnected: wooden and glass distinctly another.

23. Pick up all burners. so that the bright burners remain perfectly clean. Mr Bettert & Mr. Mr Bottle & those upstairs & those in room 20.

24. 1 oz. 1 part. B solution in dark graduates CS2 then 1/100 N/10 Sulphur in ~~[illegible]~~ CS2 in 2 same amount of CS2 that bottle is placed in. mix by shaking & decinormate

25. Try Mercuric solutions for cutting the irons. Hg in alcohol & then heat air dry in air. Ether in alcohol 95 etc.

26 Try iron carbonate mixed to thin paste with linseed oil and heated red hot.

14. OK
20 OK
21 OK
22 OK
23 OK
24 OK Calatory
25 OK
26 OK

Oct. 14, 89

A. Boil paraffin (Chas) down with water till no longer tastes acid.

B. Fill Chlorine generator & start up in the atomic acid. Then will help you. R

C. Fix the steam pipe, the clock, & if you have time to spare, the lamp-stand are about circular

D. Melt 4 oz paraffin & put into 2 oz powder chloride of Antimony.

E. Will show you Chart. S + Pud. etc.

F. see if chloroform & ether dissolves in

A. 1 pt. camphor & 1 pt. chloral.

B. 1 pt. Dimecamph.

A. Done

B. OK

C. Fixed steam pipe & Clock

D. OK

E. OK

F. Dissolves quite readily in both

A. Pass chlorine into this crucible, but first melt the flinds by passing SO₂ into the glass tube in at same time.

B. Heat after treating with nitric acid till the black turns to red.

B. Salt water + then rub hard.

C. Hypochlorite of soda.

D. Hypochlorous acid.

Last time red coating scales off

Bottle 1 B Chloride of Antimony &
2 B HCl of specific gravity 1.2. then
dip wire in, very clean. B Cl. if that is sound-
sound. put after this iron first & then dip in
the antimony.

C. Tartar emetic. ~~Pot.~~ ~~1 B~~ 4 B
HCl. ~~Pot.~~ 2 B } Inside
Water 1 B.

& plate the wire for three hours.

Cl. Take a glass of lemon of HCl & have
piece of zinc in it & put in iron wire
very clean after then put wire in bottle of
clean wire well dipped in bottle }
Potio chloride of tin 2 1/2 gms } bottle 1/8 of
Ammonia chlor 7.5 gms } all.
Water 5000 gms.

till some deposit of tin forms.

A. Make up solutions of coppering, tinning & antimoniating. Clean pieces of iron 6" by 3. & call me.

B. Tin & copper two pieces 6"x3" in dipping bath.

C. Fix drip pipe.

D. Put acid in generator.

E. ~~Fix light~~ Get left iron over from store room & varnish.

F. Heat sand bath hot & call me.

Generator running better than it ever ran before.

A. Made coppering solution now

B. not done

C OK

D OK

E Helper. Store

H Tended to chlorination

No. 5th

A. ~~Use~~ Make up an all cyanide copper bath. 1 g cy to 4 water. dip iron in it for preliminary coating. If the bath is not alkaline, make it so. When the first coating is very delicate, it will in another of copper bath. a very slight current, or. no need to make a cyanide. Acids any copper wont plate from from acid bath but must have film first as in alkaline bath first.

B. same as yesterday. When film on, put in acid bath + take + pass H_2S over them for 5 mins. in cell bell.

C. Bath with as galvanizing iron iron but heat slightly hotter.

Nov 5th

A Cy amide copper is not soluble in H_2O, KCy, Ammon, + Caustic alkali

B Not.

C Heated Solution Sodium wire in tube passed H_2S for 20 min dark colored precipitate formed on over side time. now continue aq air Heated better equal to s

Nov 9th

A. Filled chlorine generator B

B from water vine.

Nov 10th

A. Filled generator.

B. Unfurnished wine passed through at the rate of a for per minute generally good but in some places cracked off. (8)

C.

Nov 17th.

A. Chem pulls.

B. Fire of resistance cable from up stairs.

No. 15

Made samples in

Asbestofoam	1	Asbestolin	1
"	2	"	1
"	3	"	1
"	1	"	2
"	1	"	3

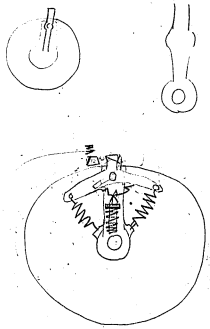
Notebook, N-89-08-15

This notebook covers the period August 1889-January 1890. There is also one entry from February 1891. Most of the book consists of notes and drawings by Charles Batchelor and by an unidentified experimenter regarding electric railways. Included also are drawings by Batchelor of ore separators and calculations by Batchelor and James W. Gladstone of the cost of battery manufacturing. The spine is labeled "95." The pages are unnumbered. Approximately 70 pages have been used.

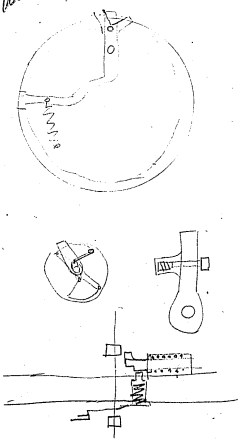
XE-172 N-89-08-15

Electric Brake for Freight Cars

Aug. 15 1889

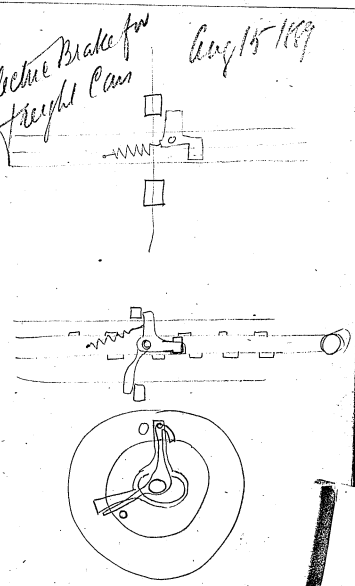


Electric Brake for Freight Cars Aug 15 1889



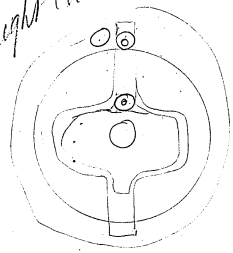
Electric Brake for Freight Car

Aug 15 1899

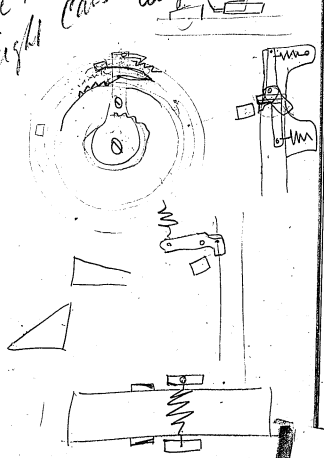


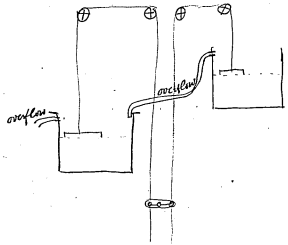
Electric Brake for
Freight Cars

Aug 15 1889



Electric Brake
for Freight Cars Aug 15 1899




overflow
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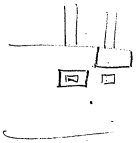
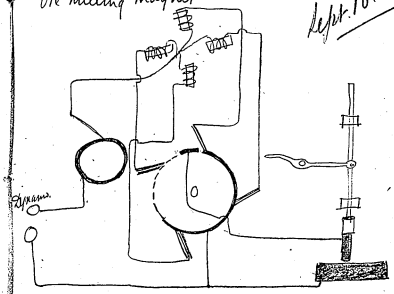
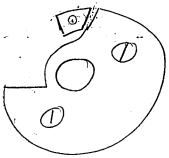


Ore killing magnet

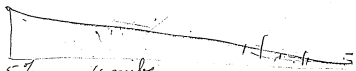
Sept. 10 1899



Breaking without spark in commutator



1450 / 50000 | .34
4350
6500



5%

4 miles

6

$\frac{4 \times 5280}{60}$ $\frac{21120}{60}$ = 3500 feet per min

$\frac{1}{20}$ $\frac{13200}{20}$ = 660 lbs

700 -

245000

7

0

27 per gram

9 @ 27

30 / 1.66

4

97.68
92.56
5.12

20

8.75
73
365

460
606

438

1.066
26

108
456

10.66
26
10.92
4.56
15.28
3.04
18.32

Sept 20 1899

Walling, Miss —

Box Complete	64 3
4 Glass jars 13 3/4 6	.55
4 Cover	.48
8 Coffees 1 1/2	3.28
8 Lines 17	1.36
8 Soda 9	.72
	12.82

1 1/2
9

Zinc Complete	4.47	6.94	5.55
Oxide plate 8 Sat	2.40	3.68	2.944
Lines 16½¢	1.32	2.00	1.60
Jars 17¢	.68	1.04	.832
Covers 12¢	.48	.72	.68
Soda 8 9¢	.72	1.12	.896
	10.07	15.50	12.50
			4.07
			11.25

Call it 15.50

Zinc Complete	8.40
Oxide plate 8 at 46¢	3.68
8 Lines at 25¢	2.00
8 Soda Stick 14¢	1.12
	15.50

Rec Jars 26¢
" Covers 18¢

Apr 20

Changes Lines & 200 hour Lines

$13.25

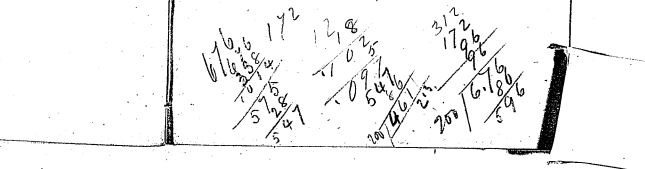
Zinc, without Oxide pl.	Lines Copper Stella	5.533	748
		2.40	39 312
Lines		1.32	21½ 172
Soda.		.72	12⁸ 96
		10.07	13.25
			2.69
			10.60

3

see next page

15	13.25
	1.98
	11.27
5	5.64
	10.70

Altus Line & 200 hrs



Prime cost of Battery Sept 18th 1869 Lockwood

Material used	Lapsweld Stars	Labor	Material	Total
Battery Box.	$ c	$ c	$ c	$ c.
4 pcs 1 pd Black Wood 1½" & slowing 5% wash			1.275	
1 pair Dingles			01	
1 pair Handles			056	
1 pcs screws & nails		35	028	
2 boards 1 by 6			033	
2 binding Posts			096	
Shelves			050	
Lead lining 5 lbs @ 6½c less 20%			481	
Electrical pins			01	
3 pr 2in Copper wire		13	02	
4 wire punchings			01	
2 binding posts copper			005	1 6213
Glass Jars				
4 cop jar washers. 1 Doz @				
4 rubber bands			336	
4 Porcelain cords			04	
Putting Jars & lining cords			0375	
4 safety disc rubber	06			
Double Zinc Clamps 144	072		04	5135
1 Double Connector			288	
4 Battery Jars 8 1 10 lb 40% wash			04	04
4 Covers allowing 5%			55	
			18	73
Supplies				
Copper Plates	444	$2 752.8	$3	1928
8 lb cast copper 12½c				
casting 8 lb cast cost	-	1 00		
Finishing casting Labor 5%		072		
Pressing plates Labor	04	-		
Scrap 8 cast cost	10	-		
- Labor	-	04	1	272
Forging & Burnishing	02	-		
Copperas wash & Lye wash & Sulphuric Acid	09			
Zinc Plate.	-	01		
8 pounds casting 10 lb wide casting cost				
Casting Labor	06	70		
8 pounds for 4 wire cost cost		008		
Casting Casting Wiring		04	-	898
Amalgamating Labor		04		
Weight for 8 lbs 1 lb 5% for waste	02			
Collate Below		04		
		444		444
Royalty on 12 cells	75	$5 0528	$5	8038
		1 20	1	20

Battery Box Fittings material 25% & 6c — $ 2.752 — 688

Labor 44c increased 500% — 2.20

$ 5.640

Acid Plate material 25% & 6c — 1.06 — 265

Labor 21c increased 500% — 1.05

$ 2.375

Zincs material 15% & 6c — 80c — 12

Labor 10c increased 400% — 40

$ 1.32

Soda cost delivered 6c — 48

50% — 24

.72

Battery Box & 5 Cells.

Acid plates	2.375
Zincs	1.32
Soda	72
	$10.055

We figure 30% on these prices to get the $13.25 & take off 15% & 5% to meet price $10.70. leaving margin for us to meet bottom price $13.25 less 20% & 5%. bringing it down to $10.07 for large contract.

[ITEM FOUND IN BOOK]

SEE ~~above~~ Upright page for prime cost.

{Estimate lowest price $10-07 only}
{ preceding page.
In this estimate.

Battery Box + fittings including everything except supplies is figured at.
(material 25% on + labor 5 times cost) pig $5-64
Copper Plate at same rate. $2 37
Zinc (material 15% on + labor 4 times cost) $ 1 32
Soda (cost delivered 6¢) 50% on 72
$10.05

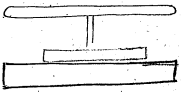
This just coincides with your calculation of lowest price we can sell battery $10.07.
I doubt think it would be good policy to increase price of Zinc to same ratio as battery fittings and copper plate as the royalty is split up between these two —
We figured the Zinc low purposely —

Edison's new System of
Street Car propulsion

A central station delivering
1200 Volts & supplying by underground Conductors
current transformers every feet
along the line — These receive
current at 1000 V. & deliver at
20. — They are placed in iron
boxes under ground & they supply
the current direct to the rails

The motor ~~receives~~ runs in one direction
all the time & receives its current
direct from rails. — It drives a friction
device whereby ~~it~~ the car may be made to
go ahead, back, or stand still, without
stopping the armature & has a variable
speed between 2 & 9 miles per hour

As regards the HP to drive a car notwithstanding the fact that Sprague puts on a car 2 15 HP motors ~~that~~ ~~that the~~ we have designed each ~~for~~ car to have a motor of maximum capacity of 7 HP. which will work at 80 p c efficiency when at 3½ HP & only 50 p c at ~~max~~ 7 HP.



94 Grain

60

120
2400
2660
5760
57

Dec 9 1889

4 Transformer

Left with no load

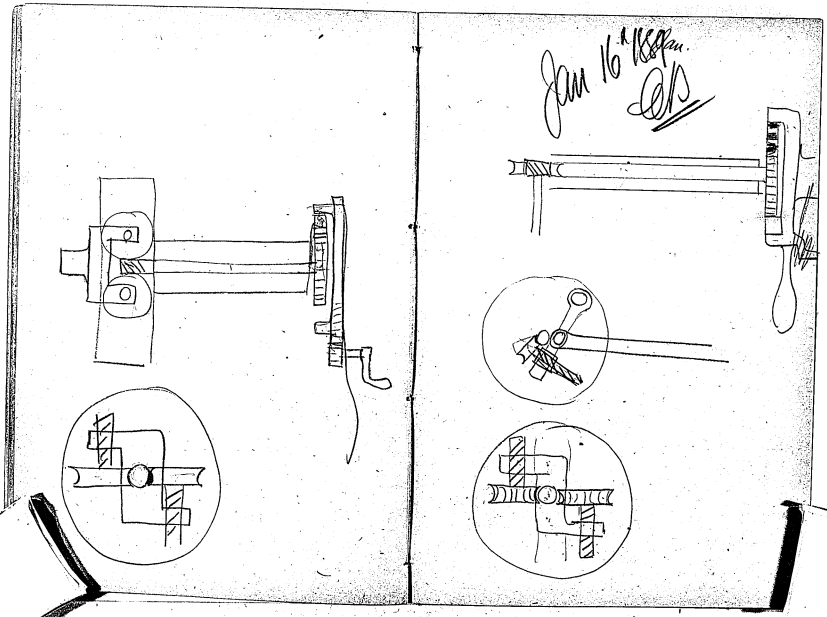
Dynamo { 1200 Volts 16 amps.
1200 Rev. Res. 1.8 ohm.

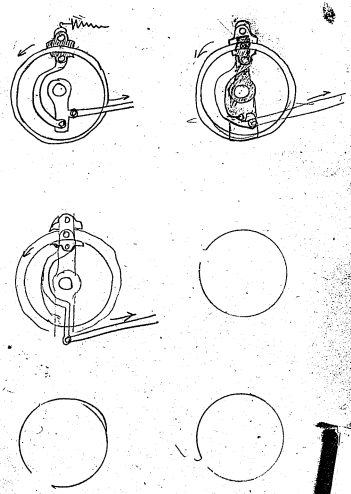
Dynamo motor
#4 machine with base lengthened

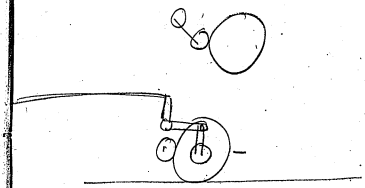
Primary 1100 Volts no load
1900 Rev. Res. 5.5 ohm.

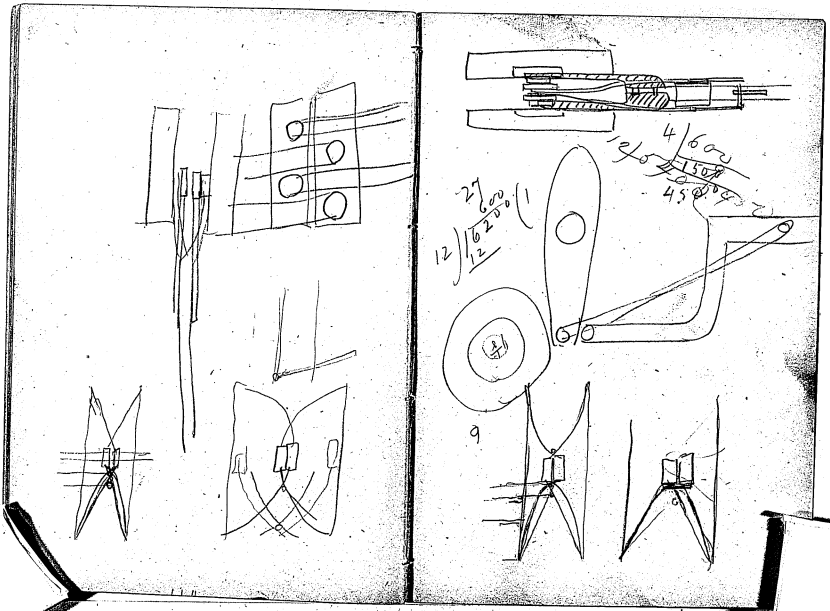
Secon. 21 Volts No load
1900 Rev. Res. .001 ohm.

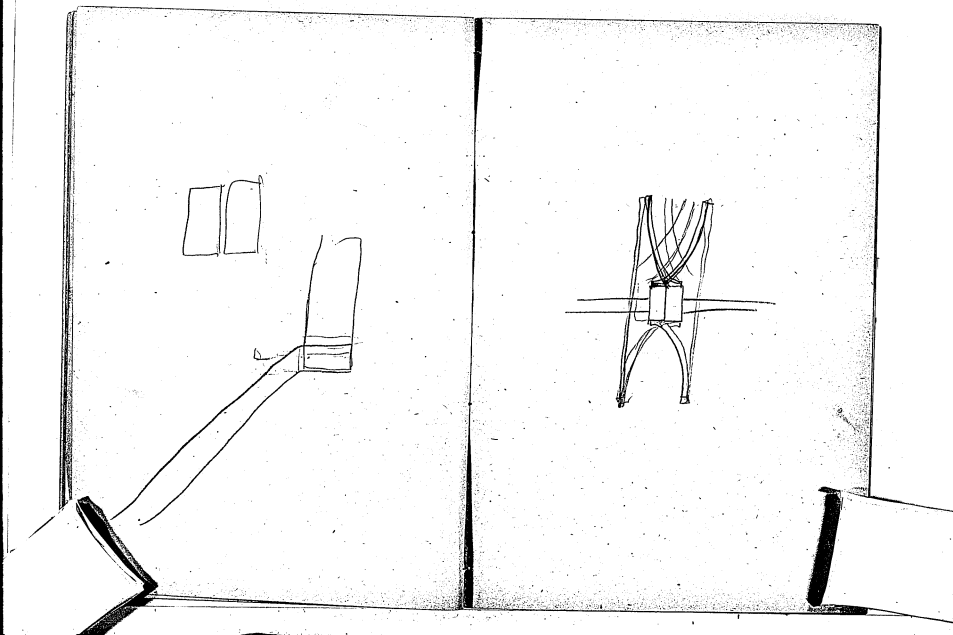
Only current enough to charge jets in secondary — no heating from Foucault currents.

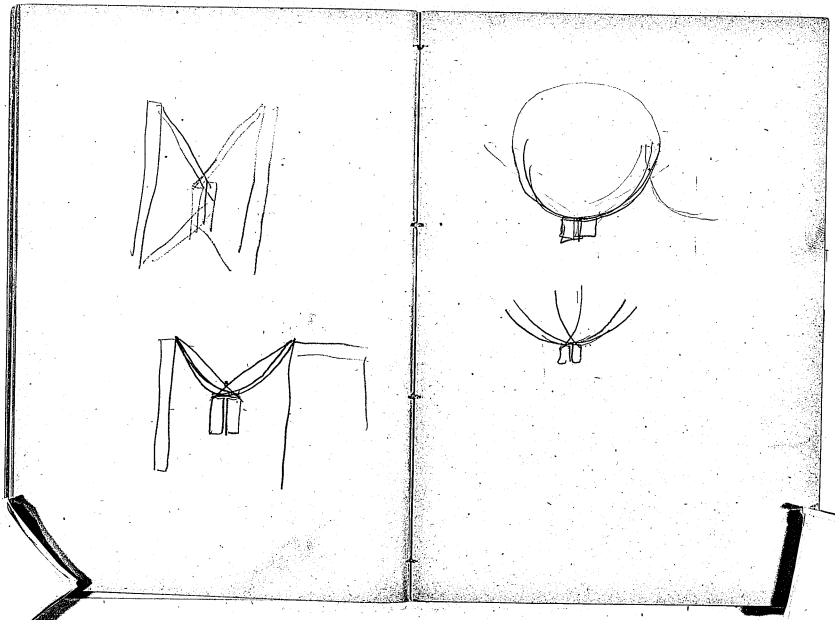

Jan 16 1889

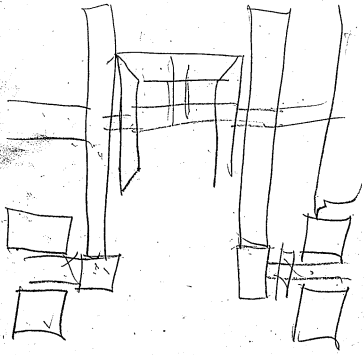


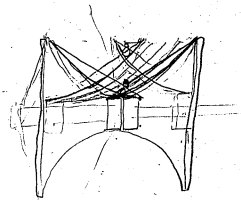


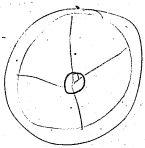

4/600
1500
45000
27
600
12)162
12
9

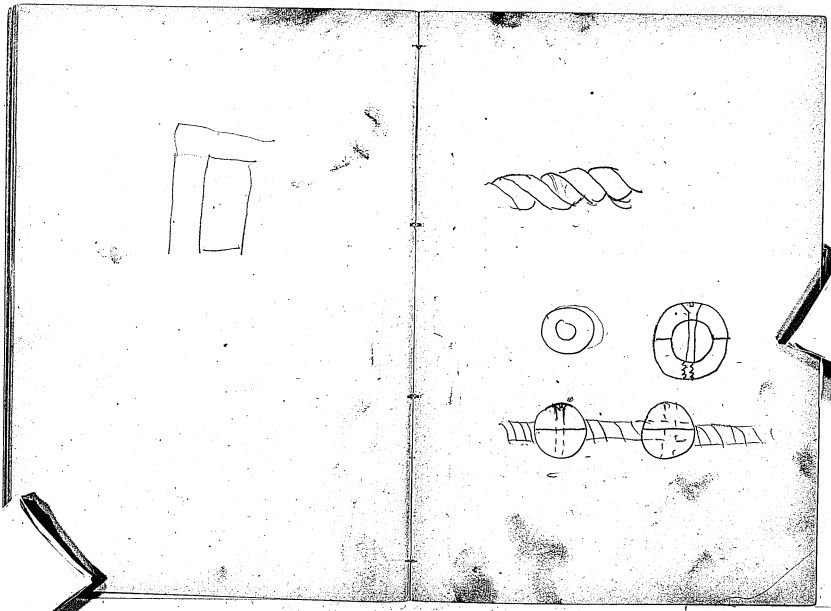


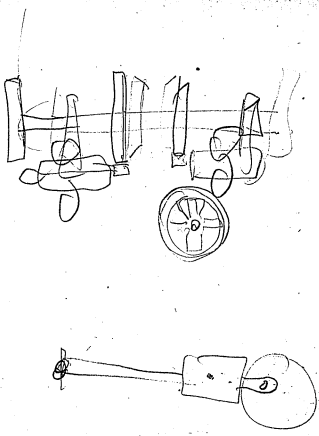


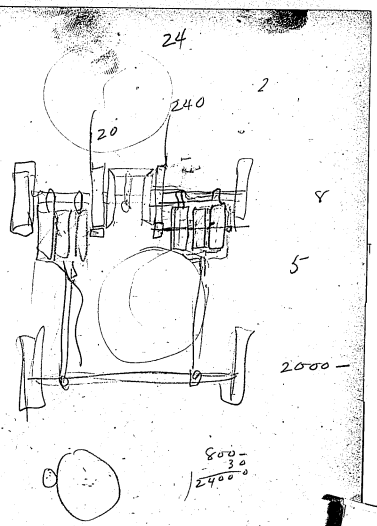


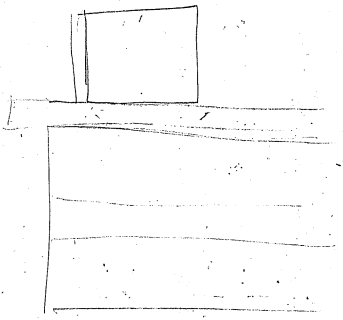


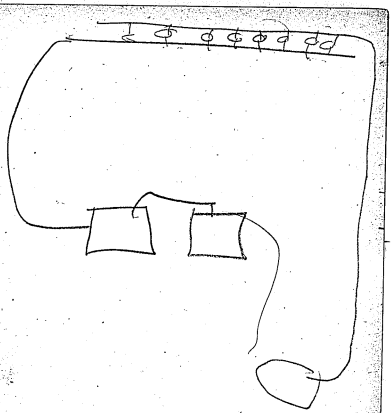


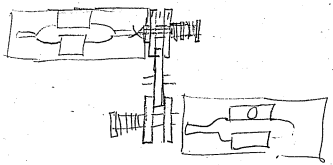





24
240
20
2
5
2000 –
800 –
30
2400 0







6.25 Amperes
8 Amperes

Wearing test of Sprocket & chain for driving street car
single chain 5/8 the width of chain used on car.
Speed of Motor = 1285 Rev per min
" of Belt 1810 ft " "
Pull on " about 100 lbs
Amperes in Motor 35
Volts 100
Started Jan 28 - 4 P.M.
Stopped " " 6 " "
Started " 29 7 am

2 test
Amperes in Separate Motor running chain light 4.5
Weight - of Prony Brake 56 lb

Sperry Dynamo Feb 20 1891

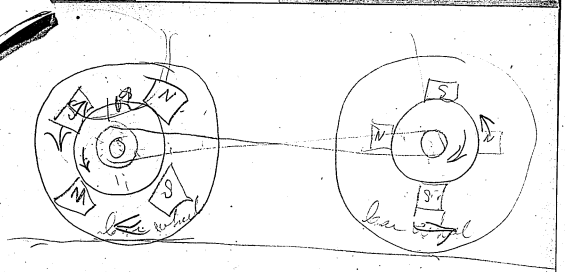
speed & full load ~~[illegible]~~ per min

Driven by H & Machine

to determine rise and fall of potential by position of brushes.

Current in Motor about 70 amperes

Current	Sperry Dynamo Speed	Volt	Degrees deflection from Neutral of brushes	Edison # 4 Current	Edison # 4 speed	Edison # 4 Remarks
10 amps	1200	500	46°			Current in Motor
10 "	1200	450	51°			70 amperes
10	1220	400	56			60 amps
10	1200	350	59°			55 amps
10	1200	300	62"			50 "
10	1200	250	64.5			48 "
10	1200	200	67°			42 "
10	1200	150	70			40
10	1200	100	40.5			38
5.5	1200	50	50.5			36
						20


N
S
N
S
S
N
N
S

Length of Rail needed
distant from Machine shop
to curve in Phoenix Yard
400 ft

length of outside rail
of curve 61 ft

from curve to fence 290 ft

33 ties to 100 ft

4 joints in 100 ft

curve radius 40 ft

1.342 | 6.000 (7.457
9394
6060
5368
6920
6710
2100
1342
7580

36
25
61

7.457
00
23.530

14500 ft of rail

478 ties

14500 ft of rail with splices and bolts

33 in

14.5

14.5
33
435
435
478.5

14
03
42

42
2
6
8

270
61
350
350
700

270
61
331
~~1850~~

350
400
750

1653
400
1453

with fish Plates

750 Bolts

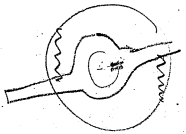
700

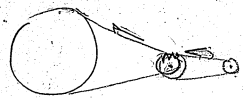
1450

350
3

33
3
99
6
115

3 | 000
166
2
12 | 3 32 2
27 ff.





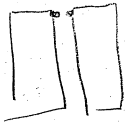
400 X 140 = 56,000 = 78

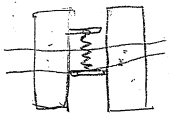
80 HP

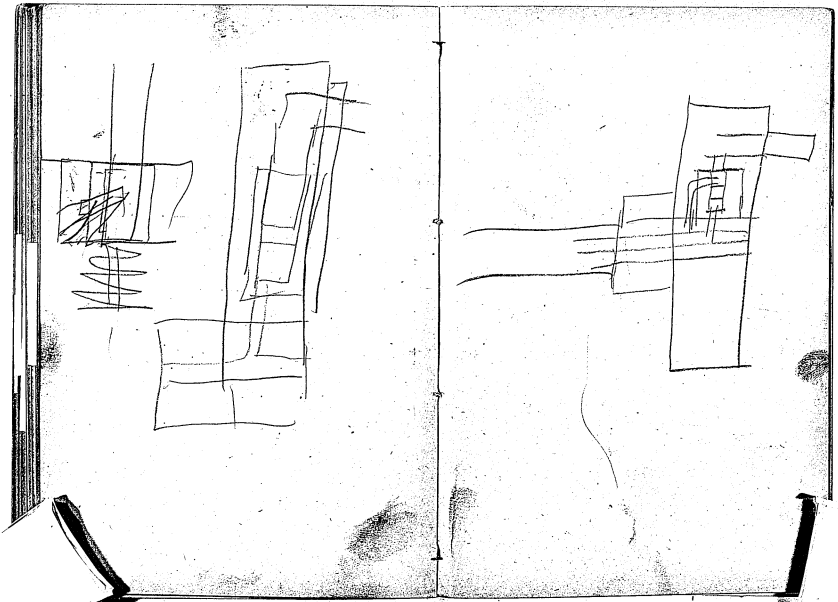
2000 ft

33,000

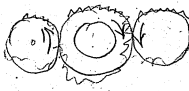
$\frac{80 \times 33}{2} = 1320$





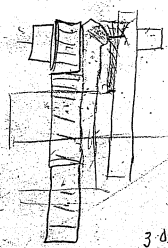


375
3 | 1,150
383
40
1,320



266
30
7980
39

32
4
128



30
400
30
12000
400

93
16
1,9E7

8.75

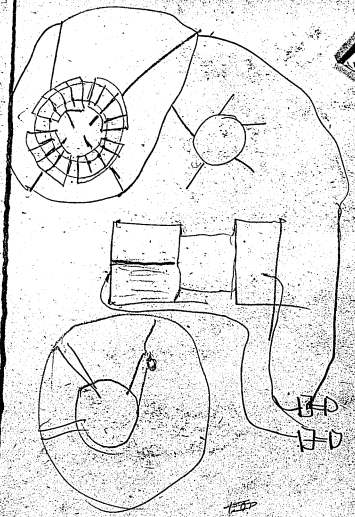
266
500
133000
4000
180

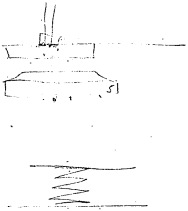
Notebook, N-89-08-30

This notebook covers the period August 1889-April 1890. At the beginning of the book are notes and drawings by Charles Batchelor regarding electric brakes and electric railways. There are also notes by an unidentified experimenter on the use of the "Edison meter," meter readings for Glenmont and three other homes in Llewellyn Park for March and April 1890, and notes by Arthur E. Kennelly regarding electrical experiments. At the other end of the book are additional drawings by Batchelor on the electric railway, along with calculations by Kennelly concerning electric power distribution at Ochre Point in Newport, Rhode Island. In addition, there are notes regarding a series of electro-cautery experiments. The pages are unnumbered, and the book has been used in both directions. Several pages have been removed from the book. Approximately 120 pages have been used.

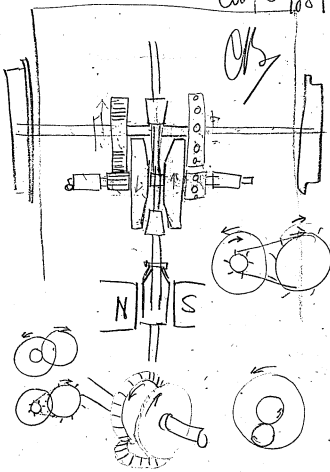
(*E-172)

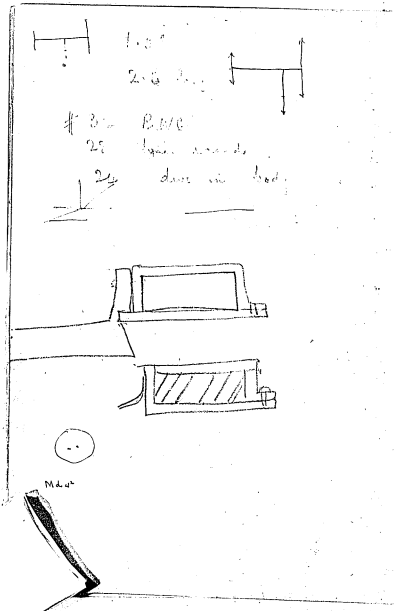
N-89-08-30





Aug 30 1889





Dec 27 1889

Test of Car motor

20½ V on fields

85 Rev. per minutes

1·1 Volts at Arm terminals

Transformer was running with 100 Volts on primary

3·1 Volts at terminals

288 Revol.

20·6 Volts on field

Transformer Alt. 200 Volts

When field charged with 44 Volts speed was 220.

House service mains.

section

80	100	120	150	200	250
445	270	320	1305	725	
530	470	830		675	
505	475	475		1400	
770	300	1625			
475	350				
1225	240				
125	175				
150	2240				
270					
605					
5,390					
2270					
1625					
1305					
1400					
11950					

directions for using the Edison Meter.

Clean the plates thoroughly with a file, taking care not to handle the zinc with the fingers.

Amalgamate them thoroughly by dipping for a moment into dilute sulphuric acid (about one part acid and 15 water) and then in mercury, the superfluous mercury must be removed, and the plate must present a clean and silvery appearance.

Varnish the copper side just a little above the zinc, to prevent the formation of sulphate of copper in the solution.

Carefully dry the plates in warm dry place.

Weigh them carefully [illegible], after which weight the couples together, as a check on the single weights.

In fastening them, be particular not to touch the zinc with the fingers as the grease will prevent the deposit

on that place, ~~before allowing so much extra surface, as well as increasing the weight.~~

Place in bottles and fill with solution about one eighth of an inch above top of plates, cork up thoroughly and distribute.

The ends of the rods should be lightened with a piece of every bottle, also the inside of the clamps of the meters.

The old meters should be taken out of the cells and immediately washed off gently in a jar of water, to remove all surplus of zinc solution, which would otherwise crystallize and increase the weight, producing an error in the meter system.

Dry thoroughly and weigh carefully, ~~weighing as before to check the zinc weight.~~

The amount of current that passes through a meter is $\frac{1}{975}$ part of the whole current.

The fractional part of the entire current which passes through the bottles remains for one plate and deposits on the other an amount of zinc equivalent to 1.224 milligrams per ampere hour of current.

The mean of the gain and loss of the anode plates of their cell.

The bill can then be made out [illegible]

Directions for using the Edison Meters

Clean the plates thoroughly with a file, taking care not to handle the zinc with the fingers.

Amalgamates thoroughly by dipping them for a moment into dilute sulphuric acid (about one part acid to 15 parts water), and then in mercury; the superfluous mercury must be removed, and the plates must present a clean and silvery appearance.

The ends of the copper rods must be cleaned with a piece of emery cloth, also the inside of the clamps of the meters.

Varnish the copper rods just a little above the zinc, to prevent the formation of copper sulphate in the solution.

Carefully dry the plates in a warm dry place, after which they must be carefully weighed. In fastening them together, be particular not to touch the zinc with the fingers, as the grease will prevent the deposit on that place.

Place in bottles, and fill with solution to about 1/8 of an inch above top of zinc, cork up thoroughly and distribute.

The returned plates should be taken out of bottles, and immediately washed off gently in a jar of water, to remove all sulphate of zinc crystals, which would otherwise crystalize and increase the weight, producing an error in the meter system.

Dry thoroughly and weigh carefully.

The amount of current that passes through the meter is $\frac{1}{775}$ part of the whole current.

The fractional part of the entire current which passes through the bottles removes from one plate and deposits on the other an amount of zinc equivalent to 1.224 milligrams per ampere hour of current.

The mean of the gain and loss of the couple is divided by 1.224 and that gives the ampere hours of that cell.

The bill can then be made out.

Numerator of Oxidized iron ore
ring
Weight in air, 2 lbs 11 3/4 ozs.
Weight " " with tape 2 lbs 12 ozs.

[illegible] at [illegible] terminus
with [illegible] [illegible] 5.1

13½ [illegible] per minute

[illegible] with [illegible] volume
at [illegible]

[illegible] 17 revs per min

[illegible] at [illegible] 1 amp

[illegible]
15½ [illegible] per minute

4Y
54 13/8

15 1/2
9 1/8
11 3/4
12
8 3/8
54 3/4

19 1/2
28 1/4

5 7/8
11 3/4
7 3/4
19 1/2

On one dead

" "

Meteoplates for March 1890.

1	80.989	81.366 161.493
2	80.436	80.127
3	78.526	77.802, 156.072
4	77.456	78.270
5	78.703	78.224, 156.187
6	79.476	79.963,
7	72.965	72.764, 149.942
8	76.971	77.179
9	72.690	73.162 146.343
10	75.666	75.186
11	78.854	78.983 157.085
12	78.235	78.103
13	75.098	76.188, 147.473
14	72.329	71.357
15	80.030	81.062, 158.926
16	78.867	77.909
17	79.892	80.913, 158.797
18	78.764	77.887
19	76.990	77.741, 159.457
20	82.380	81.716

27 X 2.52 6858

14.800

27" 87.925

100' line upper upper cross hair cross hair

62.011 57.296 57.296

88.052

62.011 62.008

57.296 57.296

4.715 4.715

14.802

73.250

4.715

68.535 14.803

4 divs of level produce 0.006 error at the distance of 35"

1 div 0.0015

373

273

19

290

74.82 : x :: 290 : 373

75X373

94

290) 26000 (90

90

46.8

15.2

390 : 290 :: 75

390 X 75

290

39000

6750

29250 = 100

25

16. 90

Lands Res.

Green + red 0·328 w 0·037 = 0·365
red + yellow 0·343 + 0·028 = 0·371
green + yellow 0·326 + 0·037 = 0·363

Bar: 74·82 Therm Bar. 67°F
17·2 C Std # 1

20 o'clock
g + y 10·265 w 9·839 T 9·763 20·5°C
g + r 10·250 9·922 9·836
r y 20·170 19·827 19·7 Temp Hg 15·4°C

Chronometer @ zero 11·926

20·12 Current on clock 1·8 amp 16·638
20·25 10·990 g r 11·15 g + y.
10·9662 10·824
20·30 C. 20·594 y g 11·62 y r 23·18 w
11·294 ·837
20·40 23·946 r + y 23·988
23·937
g r 12·28 12·28 g + y
12·932 11·954
20·58 28·970 r + y 25·467
25·467
g r 12·96 12·97 g + y
12·1632 12·1644
TB 21·00
21·13 31·650 r + y 26·50 26·157
g r 13·49 13·485 g + y
13·162 13·159

~~31·806~~

21 × 252
5334

0·0131 ÷ 30
·00043 × 9 = ·00387
·0077

0·0178
·014

0·0139 0·0239
0·0378

0·0340
0·0440 0·037
·0780
·0370
·041

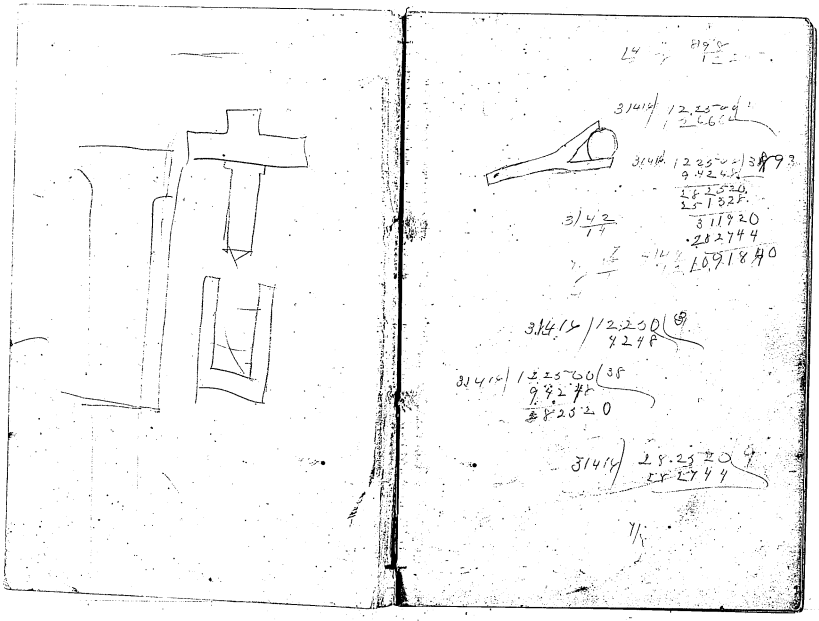
Time	Calls:	g·ry	Res: g+r	g·ry	Temp: Obl	Ob
21.28	34.502	27.555 / 27.207	13.797 / 14.103 / 13.775	13.694 / 14.028 / 13.734	210°F / 250°F	
21.31	37.158	28.330 / 27.957	14.36 / 14.032	14.30 / 13.974	220°F / 250°	
21.60	[illegible]					
.50	36.722	[illegible]				
.55	34.960	[illegible] / 26.707				
22.00	31.436	26.07 / 25.787				
22.06	28.320	25.07 / 24.737				
22.16	25.190	24.02 / 23.677	r·g·	g·ry.		
22.29	21.790	22.97 / 22.627	11.612 / 11.292	11.60 / 11.274	22.51 / 22.227	

T.B. 22.2°C T. Hg 16.6°

Meter Plates for April. 1903

1	76.526	154.233	Mr Yates
2	77.731		
3	83.612	167.725	
4	84.116		
5	80.922	164.121	Mr Lutkin
6	83.201		
7	84.800	165.544	
8	80.746		
9	81.288	164.683	Mr Turner
10	83.395		
11	81.588	159.763	
12	78.177		
13	80.905	155.371	Mr Ross Clarke
14	74.467		
15	74.714	157.065	
16	82.352		
17	80.951	159.202	
18	78.252		
19	79.123	161.467	
20	82.344		

[THIS BOOK WAS USED IN BOTH DIRECTIONS. THE FOLLOWING PAGES WERE FILMED FROM THE BACK END FORWARD.]



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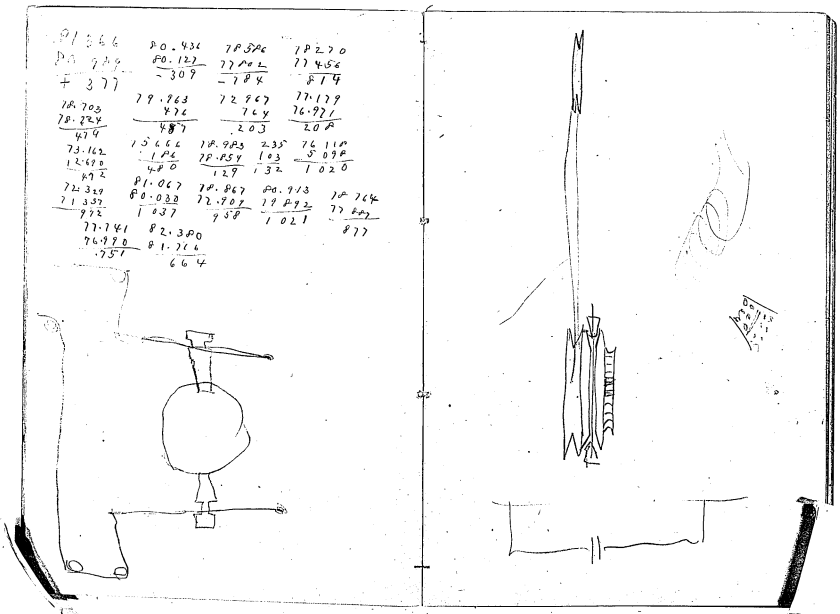


2 686 784 479 411
343 1588 487 206
796 966
472 484
480
992
476

261 1992 2095 1021 1415
131 9.96 1048 877 708
1898
946

1224/131000 (107
1224xx
08600 | 1224996.000 (814
8568 97924
1680
1224
4560
3672
888

343
1.224/343.0000
2 835 2941

Log. of 1.224 = 850 2480
2. 205-0461
204 1200
20 11261

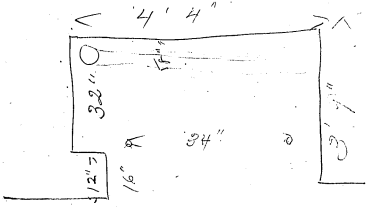
1224/796.0000 (650
734xx
6160
6120
400

1.224/343.0000 (280.2
2448xx
9820
9792

1224/206.000 (168
122xxx
8360
7344
1016
972
368

1224/494.000 (2800
367xxx
11880
11016
6640
6120

1224/4388
367xxx
10880
9792
1088.0



1224/1048000 (856
9792xx
6880
6120
7600
7344

1224/700000 (577
734xx
6120
9400
8568
8320

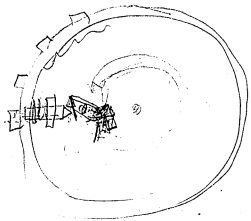
1224/946000 (773
8568xx
8920
8568
3520
3672

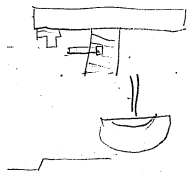
563
2
1126
495
1980

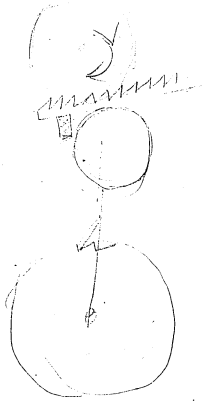
1224
3020
120.80

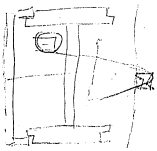
10
10
10
10

120	44
104	365
124	355
98	343
107	157
114	300
95	39
75	187
88	399
98	136
120	400
144	582
161	163
120	347
130	395
111	142
172	485
125	126
161	71
295	270
197	321
141	120
116	120
320	140
162	26
128	143
165	6136
163	
176	
4295	









80.989
80 436
161 425

81366
80 127
161493
161423
6P

78 5P6
72458
156042

77 802
78 220
6072

72965
76971
149936

77264
77179
149943
34

78 703
79 416
158119

78 224
79 763
158187
79

72690
75666
148356

73162
75142
148348

78854
78235
157089

78983
78103
157086

75 098
72 329
147427
658800
158666
144

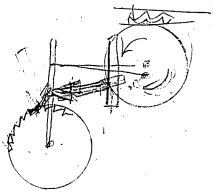
76118
71357
147476
27
48

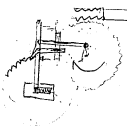
80.030
78 862
158.892

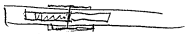
81067
77909
158876
8 887
079

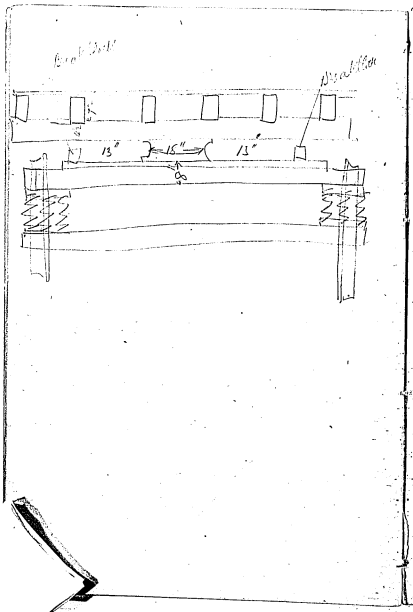
76 990
82 380
159370

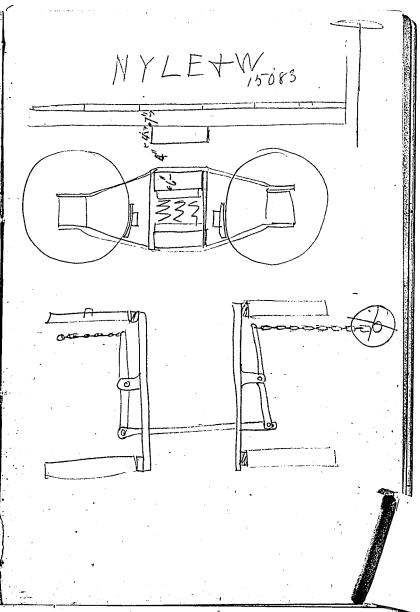
159457
370
87








13"
15"
13"


NYLE+W 15083

16"
12"
10½"
7½"

Get from Burlingham

1 Steel brush for centre rail
2 " " " ordinary rail
3 Contact with axles
4 Brush arrangement for middle rail
5 Drawing for automatic stops

Drill cores for screws & bolts
~~Fix fibre in~~
~~Drill cores for stud & pins~~
3 Wind cores
4 Plane motor brackets & drill
5 Bore field for motor
6 Drill channel iron for motor
7 Plane slides for reversing brackets
8 Turn friction rolls
~~9 Drill oil hole in cores~~
~~10 Drill dowel pins in cores~~
~~11 Turn friction washers for worms~~
~~12 Keyways in reversing screws~~
~~& filling keys~~
13 Making reversing lever rigging
14 Making automatic stop
~~15 Planing & drilling brackets for~~
~~[illegible]~~

Making Intermediate Gear Stud

~~Key on Motor Commutator~~

18 Pole fields in 2 transformers

~~Putting pole transformer bolts~~

~~Turning commutator bolts for 2 transformers~~

21 Keying in 2 trans. commutators

22 Connecting Motor armature

23 Drilling for main shaft bearings

24 " " Reversing levers "

~~Set screw in shaft spring adjust~~

~~Clear for tube~~

~~Drill holes in frame to fasten~~

~~2 Car bottom~~

~~1 Car wheel tire~~

~~Fitting worm & wheel tire~~

~~Fitting worm wheel tire (2)~~

30 2 pickers up

31 Fit up 2 Transformers
32 Extra motor armature
33 Extra transformer "
~~File on ball rings~~
~~Place brass wheel braces for~~
~~Steel brush brackets~~
36 Make 2 Steel brush line cleaner
to sketch
37 Two bars for side rail brushes
38 Two sets brushes for side rails

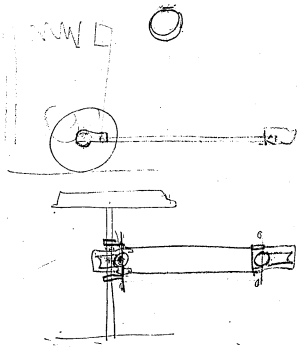
23 ½ oz of # 31 B.W.G. 0.010" s. silk cond. 0.013"
11.¾ - - - - on each limb.

1 # 32 B.W.G. wire 56 turns round.
splice each div on first layer

Wax moulds

25 Steel moulds for top ring

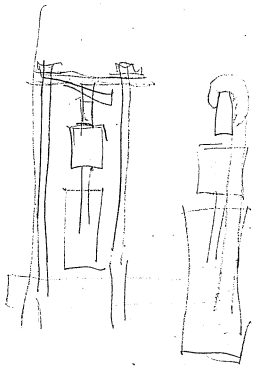
6 Steel " " phonen cylinder



Rock drill

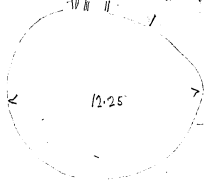
Drill & frame frame

Frame brass spool for sliding



107

1.027



1a = 182
2a = 132
3a = 82
ac = 102
H.P. = 232 = 0.93 a

21 070
21 28
52 88
114

12250
7600
26850
15350
12320
26850

2845
14
28 45
14 15
14 15
8 0
10 9 21
5 19

18
82
144
34
183

13 524

54
18
132 54

64 13
13
77

6 72
78 13
63

13
6
78

36
26
72
98

26 78
132 84

26
84
114

334
14 56
19
75

4' 59
21 10

114
13
72
85

77 86
72 64
169 150

12
23
46
276
322
69
391

+23
64
187

23
15
115
345
14

7930
14
224

23
14
92
322
69
391

63

605 on 3 / 684 77
84
224

35

224
375
30.00
430
430
505.00

5572
25 65
3007
505
3512

684
375
3420
4788
2052
256500

Station	Length	Center distance	Yards	Angle	Ground profile	Alignment	Remarks
$A_3 B_3$	500'	250'	183	31 L	35		100
$B_3 C_3$	300	150'	65	11 L	8		100
$C_3 d_3$	300	250'	132	22 L	25		100
$d_3 B_2$	660	250	80	13 L	15		100
$B_2 C_2$	600'	330	94	16 L	25		100
$C_2 D_3$	300	250	65	11 L	12		100
$D_3 E_3$	300	175	91	15 L	12		100
$E_3 F_3$	560	275	77	13 L	15		100
$F_3 G_3$	320	100	32	5 L	3		100
$G_3 G_3$	300	50	4	1 L	3		100
$G_3 H_3$	300	300	63	11 L	15		100
$H_3 H_3$	660	300	50	8 L	12		100
$H_3 I_3$	530	375	114	19 L	30		100
$I_3 I_3$	550	125	42	7 L	5		100
$I_3 J_3$	450	250	85	14 L	15		100
$J_3 J_3$	380	200		L			100
$J_3 J_3$	500	200	98	16 L	15		100
$J_3 J_3$	500	225	114	19 L	20		100
$J_3 J_3$	450	150	32	5 L	3		100
$J_3 J_1$	525	125	16	3 L	3		100
	10370						

Section	Length	Center dist.	Lamps	amps	Cost per foot
A4 X	150	50	15	3	100 3
B4 A4	220	125	32	5	100 3
B4 C4 W	740	300	179 + 10	52	40
B4 C4 E	730	500	141	24	50
C4 D4 W	820	520	125	21	45
C4 D4 E	820	410	104	17	30
H4 E4	380	200	36	6	100 5
E4 F4 W	220	150	78	13	100 8
E4 F4 S	300	175	36	6	100 5
F4 G	300	150	117	20	100 12
J4 I4	380	75	34	6	100 3
I4 O	320	200	78	13	100 12
J4 L4	380				100
L4 O4	180				100
G4 A4	600	300	67	11	100 15
G4 G	900	650	75	13	100 35
C4 H4	540	150	7	1	100
G4 H4	900	600	128	22	100 55
N4 X	380	250	76	13	100 15
H4 J4	450	–			100
M4 L4	356	150	70	12	100 8
I4 N4	220				100
M4 O W	380	125	51	9	100 5
M4 O E	380	125	19	3	100 3

Section	Length	Center dist.	Lamps	amps	Cost per foot
K4 N4	800	275	114	19	100 20
K4 N4	200	–	–	–	100 –
N4 O W	250	100	17,15	60	100 25
N4 O E	250	30	91	15	100 3
	11,180				

Section	Length	Center disch.	Lamps	Amperes	Dia. of pipe
$A_5 O_5$ w	440	350	89	15	20
$A_5 J_5$	440	200	30	5	5
$A_5 D_5$ E	380	275	35	6	8
$A_5 B_5$ w	320	325	50	8	12
$D_5 J_5$ E	380	130	73	12	8
$B_5 C_5$ w	520	225	115	19	20
C_5 Ow	380	225	58	10	8
$C_5 O_E$	300	250	69+14	65	70
$B_5 B_5$	350	120	20	5	3
$E_5 B_5$ E	450	250	14	11	8
$E_5 H_5$ w	440	275	8	1	3
$E_5 J_5$ w	430	175	17	3	3
$E_5 J_5$ E	300	150	14	2	3
$J_5 \Phi_5$	200	150	232+12	35	55
$E_5 C_5$	400	350	20	3	5
	5960				

Section	Length	Center disch.	Lamps	Amperes	Dia. of pipe
$A_2 E$	975				
$A_2 K_2$ w	960	300	99	17	20
$A_2 B_2$ E	800	350	57	15	25
$H_2 A_2$	480	275	66	9	8
$H_2 C_2$ E	360	125	50	8	5
$H_2 C_2$ w	500	250	24	4	5
$H_2 E_2$ W	900	450	150	25	50
$B_2 E_2$ E	800	475	135	23	50
$H_2 J_2$	400	150	36	6	5
$B_2 E_2$	360	150	130	22	12
$E_2 D_2$	360				
$J_2 D_2$ w	860	300	146	24	30
$J_2 D_2$ E	700	300	70	12	15
$J_2 H_2$	580	250	105	18	20
$J_2 G_2$	280	125	66	11	5
$J_2 \Delta_2$	680	300	68	11	15
$J_2 \Theta_2$	280	125	36	6	3
$H_2 \Phi$	450	200	122	20	20
$H_2 L_2$	480	300	63	11	15
$H_2 L_2$	600	75	121	20	8
$H_2 \Phi$	450	225	150	25	25
$H_2 P_2$	350	200	47	8	8
$P_2 \Phi$	450	225	130	22	20
$P_2 Q_2$	550	350	104	18	30
	13530				

Section	Length	Rise	Tangent	Angle	Sound Block
	1330				
$X_2 M_2$ w	500	275	78	13	15
$Y_2 M_2$ e	520	175	50	8	8
$D_2 M_2$	400	200	54	9	8
$M_2 N_2$ w	800	300	67	11	15
$M_2 N_2$ e	650	275	54	9	12
$J_2 N_2$	480	125	8	1	3
$N_2 O_2$ w	480	350	52	9	15
$N_2 O_2$ e	450	200	36	9	8
$O_2 P$	450	250	113	19	20
$M_2 R_2$ n	330	200	18	3	3
$M_2 R_2$ s	320	50	18	3	3
$R_2 Q_2$ w	360	150	85	14	8
$R_2 Q_2$ e	500	250	72	12	12
$R_2 T_2$ n	500	275	36	6	8
$R_2 T_2$ s	350	200	13	2	3
$T_2 S$	600	450	83	14	25
$T_2 S$ n	850	425	67	11	20
$T_2 U_2$ w	730	375	75	13	20
$T_2 U_2$ e	730	375	62	10	15
$N_2 S_2$	350	100	18	3	3
$S_2 S$ w	430	250	88	15	15
$S_2 S$ e	430	160	132	22	15
$S_2 U_2$	350	75	49	8	3
$U_2 S$ s	530	225	65	11	12
$U_2 S$ n	230	100	36	6	3

25850
5960
11780
10370
53960 ft

48.

10920 25 38
1441 38 12
1004 58 917
2528
1431 3445
250 1447
153
140 419
125 80
125 60 577
17 18 17 07
11
346 17 08
5760
5

53960
4268 80
4268 40
4268 20
4268 00
4268

5960	906	26	250
25850	17 07	15	346
10420	19 41	630	140
25850	3445		577
47930	10920		14159
102740	18479	671	5472
1		2	13 1
103,740	18,481	684	5572

901
67

Total No. of feet of main	103740
" " " Lamps	18481
" " " Horsepower	228
" " " Amperes	3512

Amperes at feeder Points

B	45	R^2	92
O	14	U^2	109
G	169		
I	254	A^3	47
N	380	C^3	63
n	76	E^3	39
P	387	H^3	40
T	305	I^3	54
u	229	J^3	8
W	314	B^4	83
		D^4	49
		G^4	39
C'	51	C^4	53
E'	138	H^4	32
H'	18	I^4	41
J'	96	K^4	87
K'	93	B^5	108
R'	126	E^5	90
S'	38		
T'	111		
V'	91		
X'	333		
Y'	191		
B^2	54		
D^2	123		
J^2	78		
K^2	117		

25	12
30	15
35	18
40	20
50	25
75	25
100	35
150	40
200	50
300	75
80	25

Formulae for Feeders

distance × amperes ÷ 13.7 = feeder area

Acme Point, New Port, R. I.

Feeder.	Distance.	Amps.	amp.	cond. needed	cond. adopted
1	550	183	31	15	80
2	1900	192	32	50	80
3	3340	207	35	95	100
4	3200	190	32		
5	3150	125	21		
6	3850	250	42	130	120
7	2925	145	24	55	80
8	1450	196	33	40	80

Junction Box, Adams 445 = 120 cond.

4	450	190	32	80	80
5	400	125	21	55	80

Cost of Feeders

			Per mains
1	80	.752 per foot	413.60
2	80	.752 ...	1424.80
3	100	.80	2704.00
4	80	.752	338.40
5	80	.752	300.80
(445)	120	.864	2376.00
6	120	.864	3146.40
7	80	.752	2199.60
8	80	.752	1090.40
			$13998.80

Mains.

Section	Length	C. M.	Lamps	Amps.	Cond.
1-2	1350	660	117	20	7425
2-3	1480	975	204	34	18281
3-4	975	500	76	13	3375
4-5	825	340	75	13	3315
5-6	1200	775	110	18	8183
6-7	1000	525	115	19	5512
7-8	1425	775	131	22	11044
8-1	900	500	111	19	5250

In determining these, 3/4 of amperes were figured on, instead of full amount, then used .75 as constant, thus.

660 x 15 x .75 = 7425
Formula
3/4 amperes x distance x .75 = conductance

Main needed	Main adopted	Cost per foot	Cost per main
85	80	.732	1012.50
200	200	1.26	1864.80
40	40	.75	731.25
40	40	.75	618.75
90	120	.84	1032.00
60	80	.75	750.00
120	120	.84	1225.50
55	80	.75	675.00
			$7409.80

House service

Section	House Dist.	Lamps	Amperes.
1 - 2	1 special 80	75	13
	2 90	15	3
	3 60	12	2
	4 60	20	3
	5 60	25	4
	6 75	25	4
	7 90	25	4
2 - 3	1 special 230	50	8
	2 130	25	4
	3 175	25	4
	4 325	35	6
	5 230	12	2
	6 190	15	3
	7 175	25	4
	8 110	18	3
	9 175	25	4
	10 90	12	2
	11 90	12	2
3 - 4	1 special 340	40	7
	2 special 160	12	2
	3 special 150	12	2
	4 150	18	3
	5 250	18	3
	6 175	40	7

Board.	Main mersed	main adopted	Cost per foot	Cost per main
17680	190	200	1.26	$256.20
540	8	80	.75	60.50
240	3	80		45.00
360	5	80		45.00
480	5	80		45.00
600	8	80		56.25
720	8	80		60.50
3680	40	80		172.50
1040	12	80		97.50
1400	15	80		131.25
3900	45	80		237.75
920	12	80		172.50
1140	12	80		135.50
1400	15	80		131.25
660	8	80		82.50
1400	15	80		131.25
360	5	80		60.50
360	5	80		60.50
4760	50	80		253.00
640	8	80		120.00
600	8	80		112.50
900	10	80		112.50
1500	15	80		187.50
2450	25	80		131.25

House Service

Section	House	Dist.	Lamps	Amp.	Cond.	Main meter	Main adapter	Cost fixtures	Cost per main
4 - 5	1 special	5 60	75	13	3960	40	80	75	420.00
	2	75	75	13	1950	20	80		56.25
Junction Box	3 special	7 00	35	6	2400	90	100	80	560.00
5 - 6	1 special	3 00	75	13	7800	45	100		240.00
	2	90	25	4	720	8	80	75	60.50
	3	100	25	4	800	8	80		75.00
	4	175	35	6	2100	25	80		131.25
	5	100	25	4	800	8	80		75.25
6 - 7	1 special	25	75	13	18850	200	280	1.26	713.50
	2 special	550	25	4	4400	50	80	75	412.50
	3 special	250	25	4	2000	25	80		187.50
	4	325	25	4	2600	30	80		237.50
	5	110	40	7	1540	20	80		82.50
	6	350	25	4	2800	30	80		262.50
	7	125	25	4	1000	12	80		93.75
7 - 8	1 special	840	35	6	5040	55	80		620.00
	2	150	25	4	1200	12	80		112.50
	3	240	35	6	2880	30	80		220.00
	4	175	35	6	2100	25	80		131.25
	5	75	12	2	300	3	80		56.25
	6	75	12	2	300	3	80		56.25
	7	75	12	2	300	3	80		56.25
8 - 1	1 special	475	50	8	3800	85	100	80	320.00
					7600				

Section	House	Dist.	Lamps	Amperes	Cond.	Main needed	Main adopted	Cost per foot	Cost per main
8-1	2	100	25	4	800	8	80	.75	75.00
	3	100	25	4	800	8	80		75.00
	4	80	25	4	640	8	80		60.00
	5	125	12	2	500	5	80		93.75
	6	60	12	2	240	3	80		43.00
	7	125	12	2	500	5	80		93.75

Formulas for House service mains,

amperes × distance × 2 = conductance

P0 = 752
1200
1504.00

752
1504.400

752
2400
451200
1504
1755.200

3400
110
3400
3740.00

4100
120
P64 0
4100
3456.00
3542.400

P0
12000
P
962.00

1	=	902.40
2	=	1955.20
3	=	3542.40
(445)	=	3740.00

Lardo 1.94

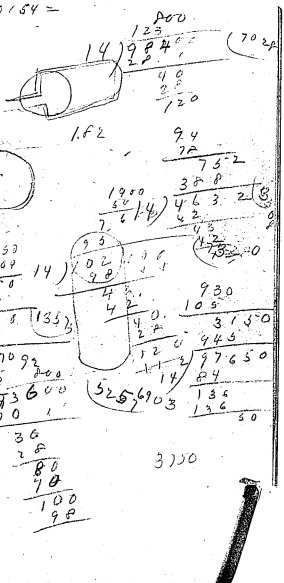
1st Lagoon 3.27

2 nd " 3.38

	Route	Length	Imp.	Bard.	meadow	
B 2	Jamaica Bassett	1900	54	7320	40	160
H 2	Marlandt Bassett	800	123	7025	75	150
J 2	Bassett	940	75	3308	35	70
K 2	Bassett Eastbrook Lotherton	930	105	6903	75	150
L 2	Bassett Maslem	800	92	5257	40	170
U 2	Alexandra Marlborough	1750	109	13575	150	300
			561			

57, 4-5

1900/54 =



Feeder	Grade	Length	Amps	Cond.	needed	adopted
a 3	11th St	1180	36	6068	65	
b 3	Lexington	1180	63	1620	15	
c 3	11th St	1220	39	6797	75	
d 3	10th St	730	40	4171	45	
f 3	Lexington	500	54	3857	40	
f 3	Lexington & 10th St	1360	8	10800	12	
		5160				
B [illegible]	[illegible] Palmetto	500	74	9235	100	
B [illegible]	Brooks St	730	33	9030	95	
B [illegible]	[illegible]	500	47	10933	120	
G 4	[illegible]	500	52	3785	40	
G 4, Cor. Hanover		920	39	5115	55	
H 4	Nolland	50	12	228	3	
K 4	Palmetto	775	87	9632	100	
J 4	Palmetto & Cor. Virginia	2400	41	14057	150	
		6175	400			
B 5	Reed St	200	70	1400	15	
E 5	Reed St & Fickle St	1000	90	12857	140	

~~4 feeders~~
4 cables in front feeders
3 " in feeders for Hampton.

$\frac{1180 \times 36}{7} = 6068$

$\frac{1180 \times 63}{7} = 10620$

$\frac{1220 \times 39}{7} = 6797$

$\frac{730 \times 40}{7} = 4171$

$\frac{500 \times 54}{7} = 3857$

$\frac{1360 \times 8}{7} = 1620$

$\frac{500 \times 74}{7} = 5425$

$\frac{500 \times 47}{7} = 3357$

$\frac{500 \times 52}{7} = 3785$

$\frac{920 \times 39}{7} = 5115$

$\frac{50 \times 12}{7} = 85$

$\frac{775 \times 87}{7} = 9632$

$\frac{2400 \times 41}{7} = 14057$

$\frac{200 \times 70}{7} = 1400$

$\frac{1000 \times 90}{7} = 12857$

Electric cooking experiments

B.P. 112 volts Nov. 17-1910

Wire	Back. Gal.	Time	Temperature
6"	.22	5'	no effect
	.25	5'	hardly percept. rise
	.28	5'	" "
	.315	5'	slightly warm
	.37	5'	" "
	.45	5'	warm
	.55	5'	slightly hot
	.73	5'	" "
	1.08	5'	hot
	1.12	5'	rather slightly red
	1.18	5'	light red.
	1.26	5'	bright red
7 amperes	1.34	5'	very bright red
14 volts	1.42	5'	correct temperature

.0025 ohm

6"	1.1	5'	slightly hot
	1.32	5'	hot
	1.8	5'	very hot
	1.86	5'	warm
	1.34	2'	very warm
	2.12	5'	light red
	2.38	5'	brighter red

$$0.195 \times .45 = .0877\,5$$

$$.195 \times .73 = .1425$$

$$1.42 \times 195 = 710$$
$$1276$$
$$142$$
$$.2769$$

Electro cautery experiments (cont.)

[illegible] .0025" March 15 1890

length wire [illegible] resistance Time Temperature

6" 2.65"

2.6

3.5 volts [illegible]

1" = .58

6 " 2.32

13 amp " 2 " 6.5

5 cells @ 0.02 = 2.15"

[illegible] = [illegible]

5×0.7 = 3.5 = 2.5

2 wire

Electro Cautery [illegible]

March 18

002 5" wire red hot only in the middle of length which was 2 3/4 inches.

at first bright red white length, but gradually cooled off.

about 12 amperes for Black gal.

Small wire, 6 inches long, heated to a dull light red with 1.2 on Black gal. after 5 min. cooled off to such an extent that no red was visible

5 in. small wire.

1.26 on Black gal.

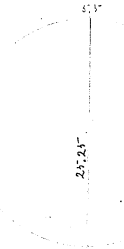
became red hot on completing circuit after 5 minutes dull red heat.

4 in small wire

2.8 volts diff of Potential between wire terminals, with 1.4 on Black

on making contact became bright red, would burn through wood. after 5 minutes there was still much difference in temperature.

in water. out of water.
2771.212 3961.912



On Tuesday a week thereafter

41	[illegible]	[illegible]
42	"	25 [illegible] "
42	"	[illegible]
40	"	75 "
3[illegible]	"	[illegible]
[illegible]	"	50
40	"	[illegible]
3[illegible]	"	[illegible]
3[illegible]	"	2 [illegible]
3 8 25	"	2 30
37	"	3 75
34	"	[illegible]
35	"	3 25
30	"	upfoward

36	300	At New [illegible]
36	[illegible]	[illegible]
32	"	at [illegible]
20	[illegible]	[illegible]
20	[illegible]	[illegible]
18	[illegible]	[illegible]
21	"	[illegible]
16	"	[illegible]
34	"	400 At [illegible]
34	"	375 " " "
36	"	350 " " "
35	"	325 " "
37	"	300
36	"	275
35	"	250
36	"	225

34 [illegible] at [illegible] trans. 175

35 " 125

35 " 125

36 " 100

37 " " " 75

37 [illegible]

36 " " 25

37 " " transformer

[illegible] maximum. At about 300 [illegible]
after increased to about 1200
variation between 1000 and 1500
current [illegible] transformer to high
[illegible] measured
Current at upper end of track to
high to be measured
no leakage between the rails.
current at bridge to high to
be measured

current at [illegible] P.S. to high
" at Rumford 72
" third transformer 70
" end of track cut [illegible] 60
no leakage.

Section	Length	C.	Lamps Amperes.	Cond.	Required
Feeder NE	3450		561	44307	475
B²	1625		54	10028	110
H²	675		123	9434	100
J²	660		78	5850	65
K²	1050		103	12528	140
R²	775		92	7227	80
O²	1750		109	21596	240
Feeder NW.	3800 + 375		240	20965	220
A³	1695 +		36	6852	75
G³	650 +		63	4866	55
E³	1700 +		39	7534	80
H³	835 +		40	3795	40
D³	+ 375		54		
J³	835 −		8	− 759	8
Feeder NW.	3425		240		
A³ } C³			75		
E³					

561
3450
2805
2164
1183
19275 45 0.0 (4435)
1740 x x x
1874
1740
1345
1305
40 0 0
39 95

1625
54
7000
8125
8.8) 88 25 0.0 (4430)
88 x x x
250
176
740

123
675
2025
1350
675
8.8) 8 30 25 0.0 (94.3)
792 x
3852
3552
305
264
410

660
28
4680
468
8.8) 5148 0.0 (58.50)
440 x x x
708
704
440
440
0

105
105
0
525 0

775
92
1550
6205
8.8) 6360 0.0 (72.27)
616 x x
700
176
640
176
640

1750
109
1505 0
1750
1505 0
(21596) (240)
8.8) 11900 5 0.0
1760 x 525 5 80
1760 440
88 350
52 792

1030
8.8) 11025 0.0 (125.28)
88 x x x
222
176
465
250
176
740

3860
240
152000
76

435) 91200.0 (209.65 8.8
870 x x
4200
3915
2850
2610
2400 8.8
2173

1760
34
15300
51

8.8) 6630000 (753.4
616 x x
470
440
300
264
360
352

6808.63
63
2040
4080

8.8) 42840.0 (4.8
352 x x
764
704
608
528
720

1675
36
10050
5025

8.8) 60300.0 (6852
528 x x
7500
7104
4600
4400
2000

835
40
8.8) 33400.0
264 x x
700
616
8400
7920
480

835
8

8.8) 6680.0 (757
616 x x
5200
4480
800

3425
240
137000
6850

430) 822000.0 (126
43.5 x x
3870
3470
3000
0

122 + 23% = x.
41 x = 23
x = 163

174
700

746) 34800 (46.6
2984 x
4960
4476
4840

= 20%

163) 32600 (43.7
746) 2984
2760
2238
5220
5222

= 25%

diff 8 2.9 HP

Page of B. [illegible] from extra [illegible]

Add Parts = 5%

~~B 2~~	~~1625~~	~~=~~	~~109 19~~	~~120~~
A 2	600	123	10390	110
J 2	660	19	6425	70
K 2	1050	147	15356 ~~14353~~	170
[illegible]	~~920~~	92	8915	95
	1730	109	23848	260

B 2				
A 2 } E 2	660	163	35860	420
B 2	975	54	10530	110
U 2	1075	123	26484	240

1625
54
6500
8125

109 19

1625
66
975

8) 103700 1750
675
1075

8) 151200
[illegible]

8) 1125000
140625

8) 190750
23 [illegible]

8) 71820
8975

3 tolls dis on double feeder 7 on funiculum
5 " " " single feeder 5 on funiculum

3) 107570
35860

163
660
9780
9780
107580

975
54
3900
4875
52650

5) 52650
10530

5) 132420
26484

Tenders for N.W. District financial feeding
Pilot Club Poole

Section	Length	Super.	Cond.	Rejects	
A3 } B3 C3	325	75	12188	130	
A3	975	36	5850	65	
B3	1025	39	6662	70	
B3	325	63	2559	80	
A3	575	40	2874	30	
I3	375	54	2542	30	
J3	120	8	1200	12	

main feeder	3450	feeders	240 cond.		
	length	amps	Cond	Rejects	
D3	375	54	2542	30	100
E3	450	8	450	5	100
A3 } B3 C3	1050	75	19688	220	250
F3 } G3 H3	750	103	15450	170	200
A3	1000	36	9000	100	100
B3	1025	39	7444	80	100
H3	575	40	7333	80	100
C3	325	63	6825	75	100
	555				

325
75
2/24375
12188

6/39990
6662

325
63
975
1950

6/35100
5850

8/20476
2559

8/22995
2874

8/20250
2542

8/96000
1200

163
20
3260

25
8

3450
240
13800
690
32.6 / 22800000 / 25400 / 19688
652000
1760
1630
1300
1304

1050
75
5250
7350
4/78750
19688

450
8
3600

750
103
5150
721
5/77250
15450

4) 36000
9000

325
63
975

1950
3) 20475
6825

1025
22
9225
2050
4) 21525
7444

573
40
3) 23000
7333

185

5350
200
300) 1070000 (3282.2
900
920
652
2680
2608
720
652
6P0

375
80
30000
400
50
32 0.00

357.97
8) 136000
4300

8) 140495
5062

989800

Feeder 5338 feet long - 200 amperes = 350

B 375 100 35 = 100 @ 300

E 400 90 50 = 100 @ 320

Main feeder 98,400
320
300

1500) 20072 (1336
5022
5210
6980 → 10518

20
23
8
52
598
900
1500

5960
37
4172
1788
220.52

900

621
38
49800
18675
23655.0
900) 20073 (2215
1953
1010
5000

400 × 80 = 32000

440 × 80 = 35200

600 × 80 = 48000

880 × 80 = 70400

720 × 80 = 57600

340 × 80 = 27200

450 × 80 = 36000

300 × 80 = 40000

500 × 80 = 40000

420 × 80 = 33600

450 × 80 = 36000

650 × 80 = 52000

1050 × 117 = 73500

1050

1050

122850 ÷ 8 = 15356

23 × 25 = 37

21

19

11

9 6

70°F = 35/9

70 : 21.1

~~7400~~

45.9734 × 1.00192

91946

4137606

459734

45973400

46061628918

1.0179) 46.640 (45.7

57440

~~1.03142) 46.0~~

April 1st 90

11 AM Resistance of coil by bridge

1000 to 100 = 47.3 Ohms

Temp: of bridge 22.5°

5 Ohms added to Spool side of balance;

7363 Ohms

23.5 Ohms

2.021 Ohms (Black)

Temp of H₂O 16.5° C.

4.6°C

7260.5

3630

0.388

46

2328

1552

178648

1.785%

46.46 × 1.01785

4646

61071.0

407160

61071.0

407160

47289310

Temp Bridge 21.9

15.5

6.4 × 0.03 = 192

1.00192 w

3630 ([illegible])
47.2893

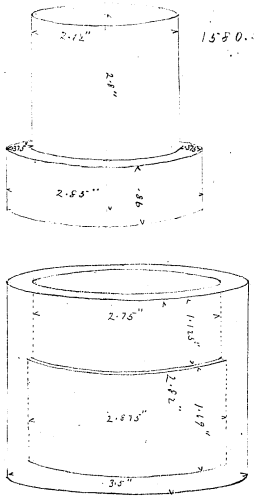
1.2276
47.[illegible]

2.021

1.2276
[illegible]
[illegible]
73656
36828
[illegible]

47.2893 | [illegible]
2001510
1169338

actual size



1580.5 grams

1219 grams

diameter when covered with oil paper, 2.13"

Winding space 1 29/32"

diameter of wire (bare) .0508"

" " " (including insulation) .0618"

diameter of fine wire (bare) .012"

" " " " (insulation) .0153

10.5 w added to #1 coil @ 23.[illegible]

#1 [illegible] 46.[illegible]

.57 w added

#2 - 46 w

T.B. 25.2°C

.450 w added

Rise of 9.7450 w thru heater

15.[illegible] added from the other coil

#1 by bridge 46.795

#2 " " 46.550 } 22.[illegible]

T.B. 26.6°C

loss: 0.088 w

#1 taller + rough

#2 shorter + smaller on bifeets

120.5 — 1 feb. 1φ

−125.5 — 285°C

+121.5

−124 — Zero shifting

+123 — slig. Cl₂

−123.7

+122

−123

4.5120 1000/min 0.118 } 4 off

Tool Steel 0.030 } Full

4.465 air 0.4 } 10 off

Wrought 0.04 } Full

4.522 0.113 } 7 off

Good 0.016 } Full

4.452 1000/min 0.079

~~1000/10~~

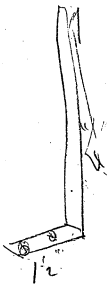
4.464 1000/min 0.023

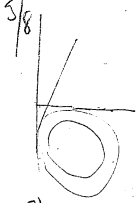
0.023

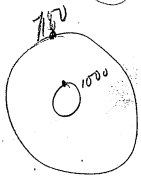
Notebook, N-89-10-21

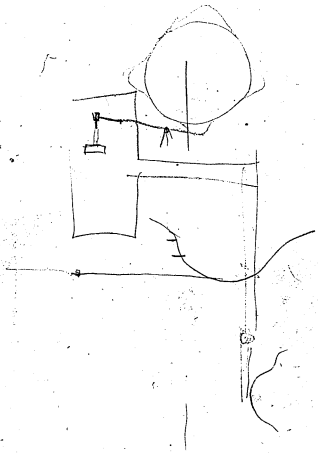
The dated entries in this notebook are from October and December 1889. The book was used by Charles Batchelor, Arthur E. Kennelly, and another unidentified experimenter as a rough record book in the Galvanometer Room. Included are notes, drawings, and calculations regarding electric railway experiments and other electrical experiments. Transcriptions of the notes and calculations can be found in Arthur E. Kennelly Notebook #2. The front cover is labeled "#570." The spine is labeled "98." The pages are unnumbered, and several pages have been removed from the book. Approximately 60 pages have been used.

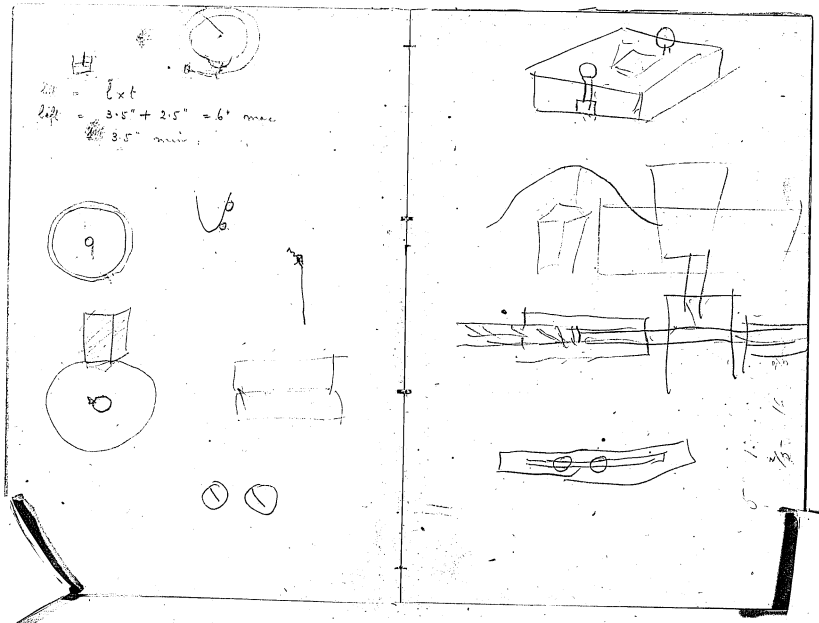
x E-172 N-89-10-21

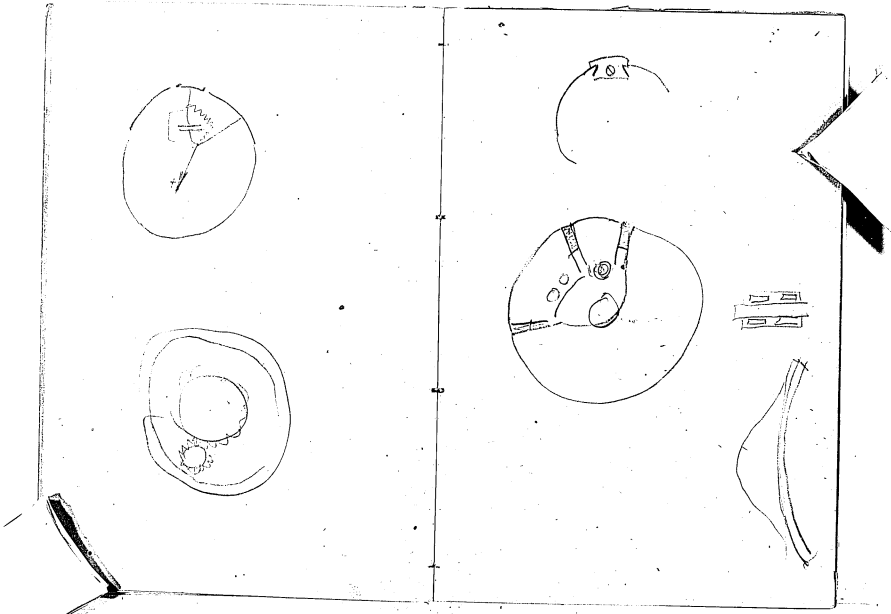


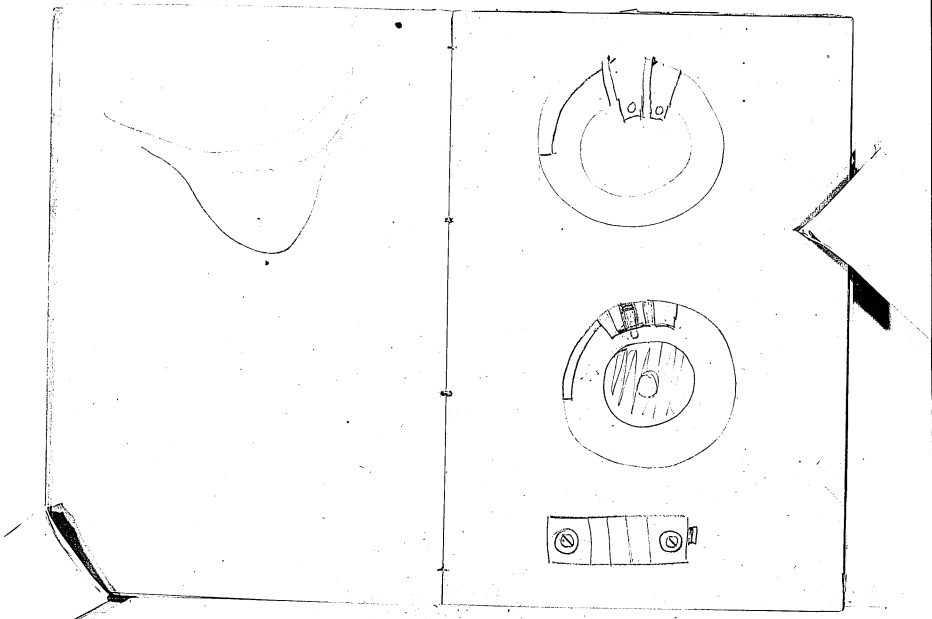


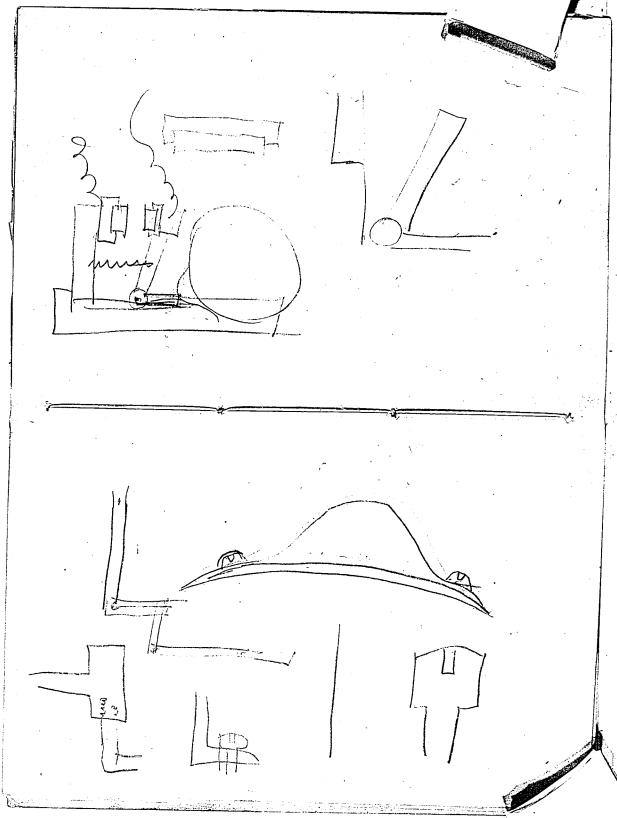


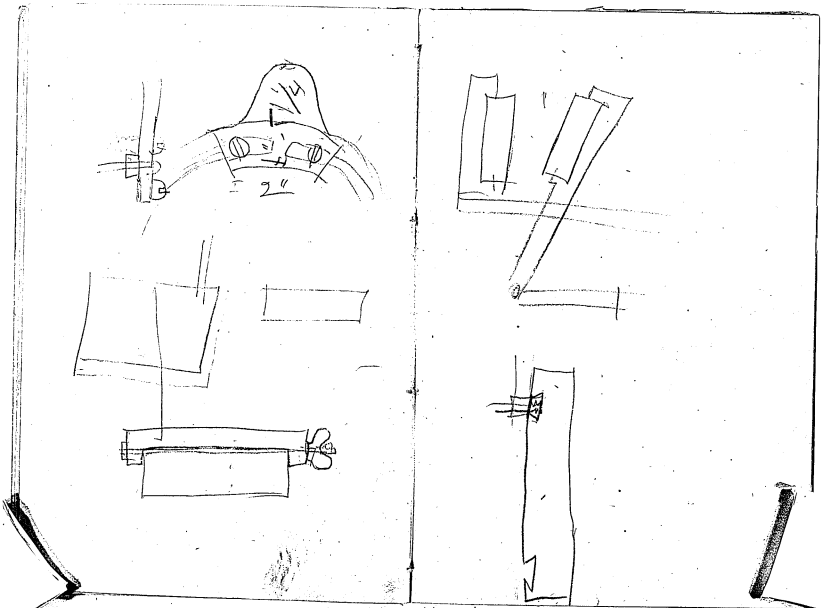



= l × t
= 3·5" + 2·5" = 6" max
3·5" min
9



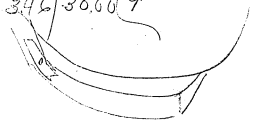





1 1/4
2"

3.46 3.46

3.46 | 30.60 | 9



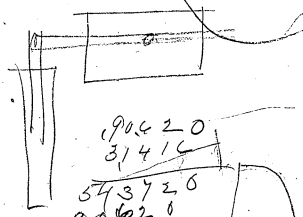
9062 | 31416 | 3
27186

9062 | 31416 | 3.46
27186
42300
36248
6052 0

127/16 28 2.
9062

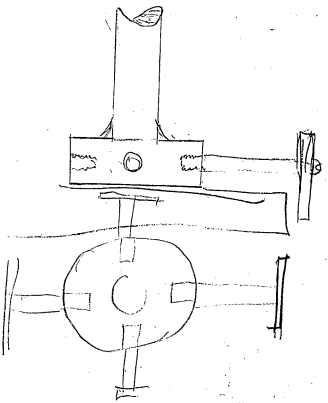
9062
28

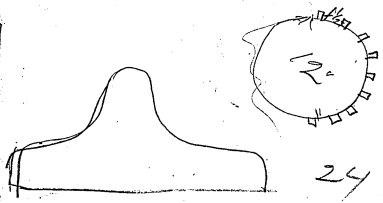
9062 0
31416



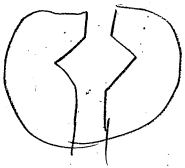
9062 0
31416
54372 0
9062 0
36248 0
9062 0
12186 0
134691792 0

134





1.5 / 36 / 24
36
70
60
100

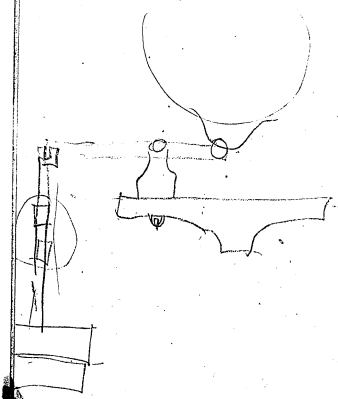


24 1½

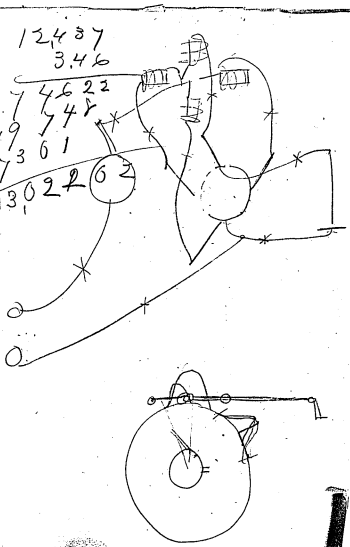
12 1/4 12,437

3.46 | 3.50 1 3
3.46

12437



12,437
3.46
7 4 6 2 2
4 9 7 4 8
3 7 3 6 1
4 3 0 2 2 6 2



43

346) 430 (1.24

346

840

692

1480

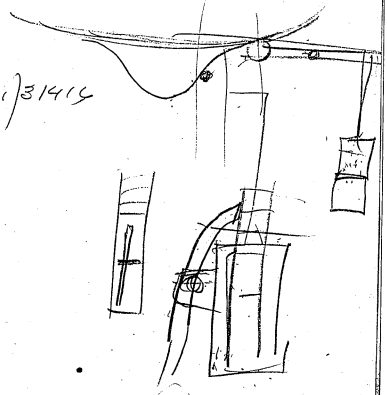
1384

960

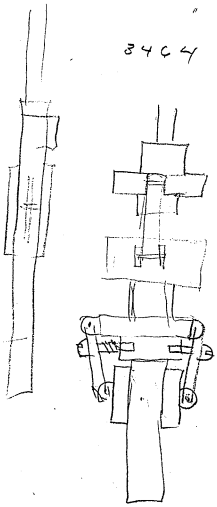
692

3416

961) 3141 6



3464



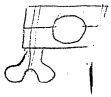
9042 / 31414 / 3464
17188
42300
39248
60520
54372
61480

12437
3464
49748
44632
49748
37301
42061718

9,373 | 31416 (335
28123
32910
28123
47830
46875

12437

335 | 480 (12835
335
930
870
2400
2680
1200
1005
1950
1675



124
3.
62185
37311
37311
41.6639 5

40

335 | 421
3

253

0

333 | 200 | 358
005
1750
1670
2750
2670
80

14 | 40 | 2
42

14 | 335
16
2010
16 | 335
5360

535 | 140

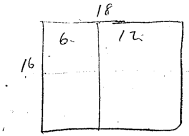
333 | 400 | 4,776
340
2600
2340
2350
2340
2350
2010
2010

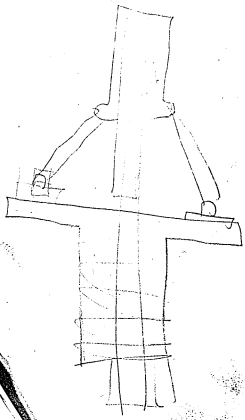
4 12 X 18 X 2 1/2 X

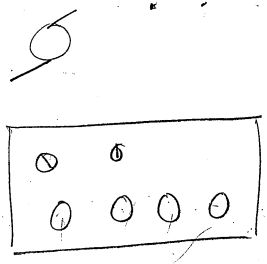
4 12 X 11 X 2 1/2 12 X 12 X 2

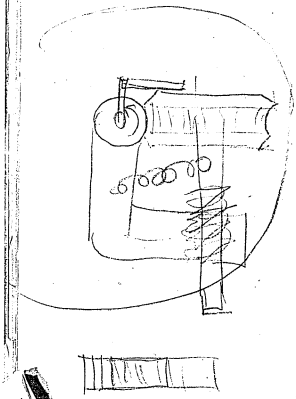
2 18 X 16 X 3 5 12 X 16 X 3

12 X 16 X 3







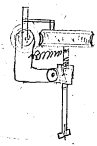


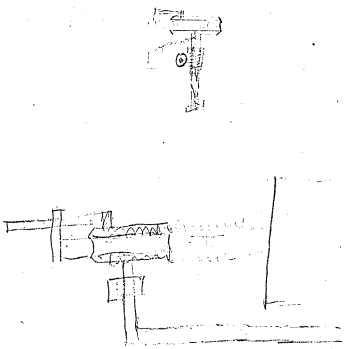
Car Brake
105 teeth 2000 Rev Worm
Sprocket 3 to 1

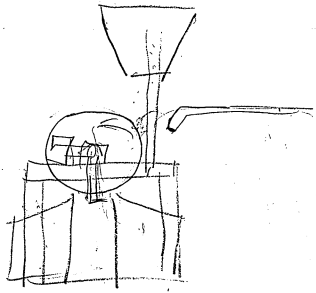
per min Motor worm 2000
Worm " 20
Brake wheel 7 about

About 25 seconds or 8 seconds

50

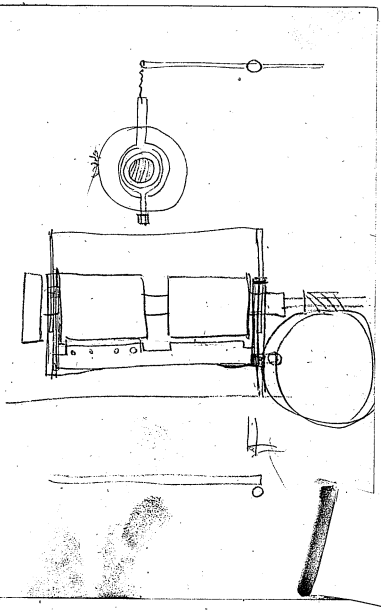


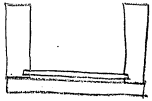




31.55 — 0.09

" 1 9.0





109 - 11215

24th Oct 89

[illegible] volt [illegible] 126 [illegible]
[illegible] amp 110 [illegible]
62 [illegible] 4 [illegible] 2 large wheel
15.5 [illegible] for [illegible]
[illegible] [illegible] 2.5 amp
2 foot 3 32 lbs.

10.75
1.3
12.05

[illegible] 0.16

416
12 amp 5[illegible] 199 [illegible]
[illegible] 4 [illegible]
18.5 [illegible] for [illegible]
27 1/4"
52 lbs 0.239 (12) 3 1/2

65th [illegible] 4.83 [illegible] 10[illegible]
4 [illegible] 16.25 [illegible] for [illegible]
46 [illegible]
[illegible] 5 [illegible]
25 3/4 lbs 21 1/2" 0.10

4 [illegible] 59 [illegible] 14.75 [illegible] per [illegible] 147 [illegible]
246 volt
11 amp 35 1/2 lb 26.5" 1/2 [illegible]

416

Running [illegible]

52 [illegible] 4 [illegible] 5 [illegible]
5 [illegible] 6 [illegible]

Now [illegible]

6.28
1.85

$$HP = \frac{PL\,3.1\,\omega}{550}$$

$$\frac{32 \times 27 \times 3.1 \times 6.28}{15.5 \times 550 \times 12} = \frac{16830}{8526 \times 12} = \frac{1403}{8526}$$

$= 0.165$ HP

$$\frac{52 \times 25.3 \times 19.5}{18.5 \times 6500} = \frac{28700}{1203} = 0.239$$

$$\frac{25.8 \times 21.5 \times 19.5}{16.3 \times 6500} \qquad \frac{10520}{106000} = 0.10$$

$$\frac{35.5 \times 21.5 \times 19.5}{14.8 \times 6500} \qquad \frac{18320}{9620} = 0.191$$

75) 6500 (86.1
503
50

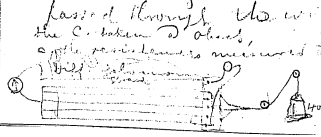
$\frac{PL\omega}{t}$

December 21. 1889.

A Strand of 7 bare soft Copper wires #16 B.W.G. was stretched on stone posts.

by its side at first called with it there were stretched 7 single bare wires of the same gauge, joined at both ends by pieces of bare Copper wire. All wires were straightened by an equal force applied at one end, and produced by some Weights hanging over a wire passing over two pulleys.

A thin bare copper wire was fastened at both ends of the wires, to which were connected the wires leading to Galvanometer. A Current of 20 cs was passed through the wires, the C. taken & observed, & the resistances measured.



100 added to single wire side.

500 div. total defl.

Observed Current 2 div. error
4.2 on single wire side

Length of Single wires = both sides between points of Contact

Stranded wire 64.5 + slack

Weight of Single wires 850 g

Stranded wires 848.5 g

Single wire gauged to $\frac{65}{1000}$ "

Strand single wire $= \frac{65}{1000}$

Strands gauged to 0.190 "

1 complete turn of strand = 5.5 cm approx

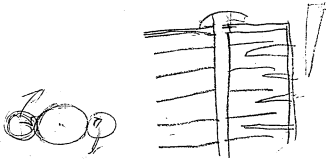
600 turns of the strand

[illegible] = [illegible] [illegible]

Let P be the force exerted at the [illegible] field line in plane of [illegible]

[illegible] the force exerted [illegible] moment [illegible] surface [illegible] P [illegible] remaining [illegible] moment [illegible] [illegible] the [illegible] [illegible]

[illegible] the [illegible] [illegible] [illegible]



20.0 volts on fields

16.6 2.1 volt on [illegible]

[illegible] 113.5 [illegible] for

193 revs for [illegible]

Speed 2050

Speed loaded

Noload 1750 per min

[illegible] 16 volts @ M.T.

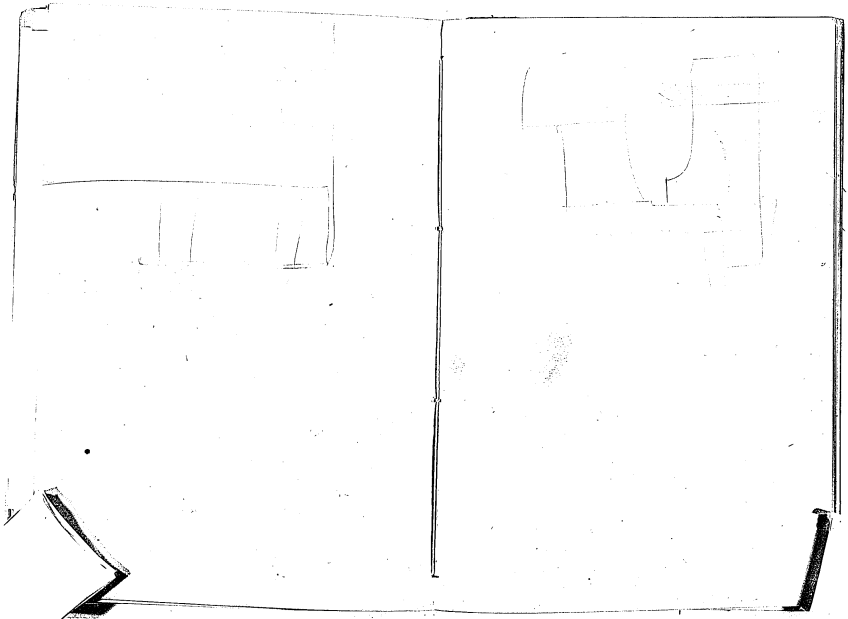
4400 275 amperes

5.5 amperes @ HPT

55000

1803 Shut down

16 Highest temp 130°F



164
6

1002
164
164

13 | 38
2 | 50

15 86
5

15 86
5

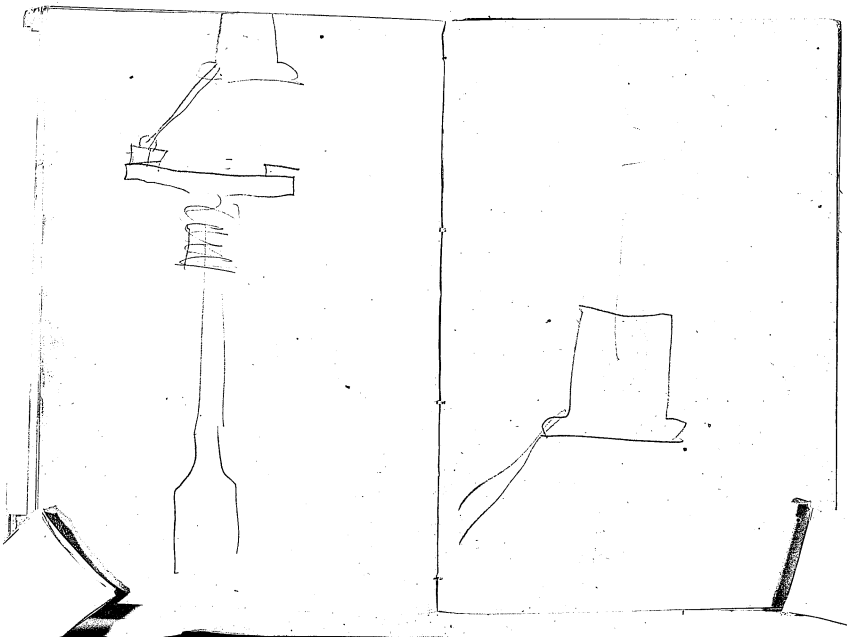
5 786
2

3 786

164
6

186

S
N
S
N



2000
1500
5000
5000
$62.500

335)4101(12238
335
750
670
800
670
1300
1000
2950

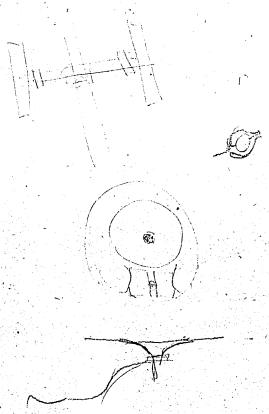
Notebook, N-89-10-29

This notebook covers the period October 1889-January 1890. It was used by William Burlingham and another unidentified experimenter for notes, drawings, and calculations regarding an electric railway system. Related material can be found in Arthur E. Kennelly Notebook #2. The front cover is labeled "#573 Oct 29-Jan." The spine is labeled "99." The pages are unnumbered except for pages 44-53. Approximately 110 pages have been used.

YE-172 N-89-10-29

#573

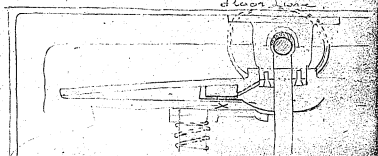
M Bulingham
Oct 29. 89



Street Car System.

Sketches

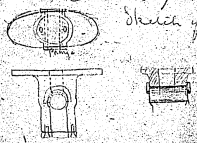
Bumley
Morton 14 vo.



Would adjustable mechanism, limiting of opening adjustable by a nut &c.

Better to have roller or ball bearing. Or at least instead of a bolt hole to make this part cylindrical & let it be merely a guide.

Sketch of top bearing



Worm

Oct 29 '89

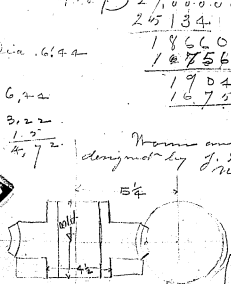
3/4" Pitch. 4.189 diameter, Pitch

4.189) 27.000.00 (6.44
25.134
18660
16756
19040
16756

Dia. 6.44

6.44
3.22
1.5
4.72

Worm and wheel designed by J. Newell Jr. Office



dia of gear outside 6.95

7-1 Quotient

Worm wheel 6½" diameter
2" deep. 27 Teeth 3/4 Pitch
Machined on Brass & rolled

Worm 4 threads 3" Pitch
4" Pitch
4" diameter. (Worm pitch 4 threads)
Outside diameter 4.45 about 4½
Worm 4" on axle
Bore 1"
Gear fitted to own axle

3.22
2
6.44
3.22
.30
3
.75
.225
.225
¼"
4½
4.45
24
4
6.5
4
6.95
6.25
3) 1400
350

Motor 1400 400 ft per minute
Our wheels are 30" dia.
9 miles per hour
30
2.5 ft dia
circ = 7.854
52800
9
47520 ft

7.854) 47520.000 (6050
47124
39600
39270
330.00

60) 6050 per hour
101 turns

100 turns per minute.
100 turns of gear.
Worm & gear are 7:1.
∴ 700 turns of worm and
c. 7 friction plates.

8" circumference 24"
½ dia 12
3) 2400
800
4
2.25

Results on Cotton 40 Mule Thread Cones

October 26

[illegible]

Efficiency of worm gear

$$\xi = \frac{\cot\theta}{\cot(\theta - \phi)} = \frac{1 - \mu\frac{D}{2\pi r}}{1 + \mu\frac{2\pi r}{D}}$$

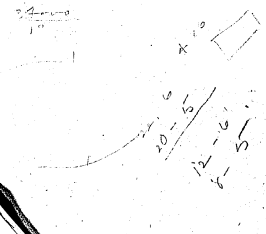
θ = angle of worm thread

μ = coefficient of friction

r = radius of the worm

ϕ = Angle of repose between metal & metal

ξ = efficiency of the worm



Methods of speed regulation.

Car wheel 1100 Revs

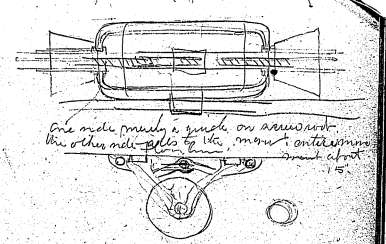
Worm 700 " } per

Armature 1400 "

Peripheral speed 4000 ft

Remarks

Screw clutch on worm is much [illegible]

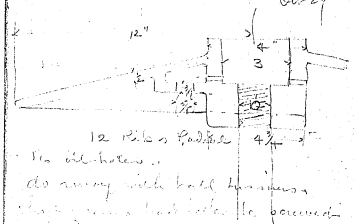


One side merely a quick or accurate

the other side applies by the worm intermediate about 15"

Sides as seen Pattern Making

Oct. 29



12 Ribs Paddle

No oil holes

do among rich bell [illegible]

[illegible] to be secured

by circle with pin.

Name brass Pattern Makers Table bearing

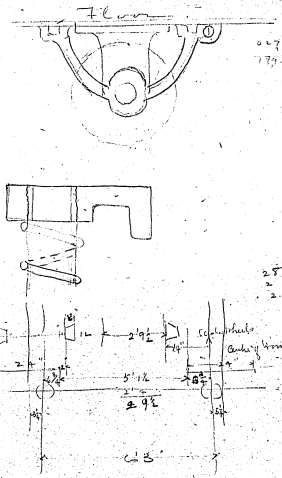
Centre wheel to rail 1 5"

Rail to bearing, bearing 2 3/4

2 3/4

1 3

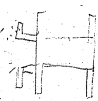
10 1/2



In this design
Heavily
Threaded
Flexure
and in mounting
on the frame.

Flexure
Pin to make
from shaft
2" Diameter.
Diameter of shaft
shell very important
when pressing

d = 4.189) 2.000000 (.477
1.67756
32440
29323
31170



D) 1.57 / .39 = .477

2/4 — 1.57 / .039 / 50

3/4 circ P = 4.189 Diametral Pitch.

$t = \frac{1.57}{4.189}$ = width of tooth on P. circle 3/4

$D'' = \frac{2}{4.189}$ working depth .477

.0374
.537

$t = \frac{t}{10} = \frac{.374}{10} = .0374$

.477
.037
.537
.374

4.189) 1.57 (.0000000 (.374
1.25 67
31330
29323
2007 0
16756
33240

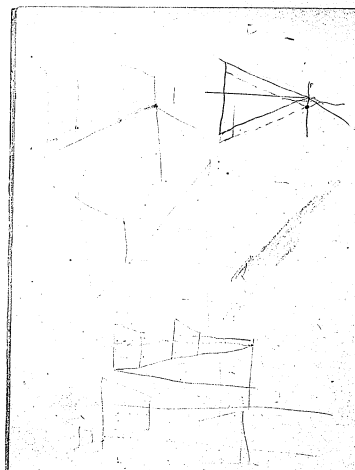
.0372

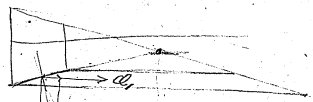
4.189) 2.000000 (.477
1.67756
32440
29323
3117 0

D = 2.72 / 4.189

4.189) 2.000000 (.6 72 Hole
2.51 134
8660
6 7756
37701
37790 .24

D) 4.189) 2.7000000 (.644
2.51134
18660
16756
19040
16756 .24





N_1 p $a_1 = p.\sin\delta$

$p = \frac{T}{\mu}$

$T = \frac{550 P}{v \text{ feet/sec}} = \frac{550 \times 8}{22.7}$

smallest $v =$ [24" dia] $\frac{1300R}{6} =$

$v = 6.28 \times \frac{217}{60} = 22.7$ feet/sec

$T = 190$ lbs

$$p = \frac{T}{\mu} = \frac{190}{2} = \underline{\underline{950}}\ \text{lbs}$$

$$W_1 = p \cdot \sin\delta \quad ; \quad 1.6 \times 450 \text{ each}$$

$$\operatorname{tg}\delta = \frac{4}{36} = .166$$

$$\delta = 9^\circ 28'$$

$$Q_1 = 950 \times .164 = \underline{\underline{156}}\ \text{lbs}$$

Crank 12" 5 -- 3 times round to make whole travel 38×3 = 114" lbs

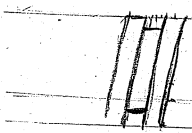
114 ÷ 8 = 14 | 156 ÷ 14 = 11 nearest

$T = t \cdot \beta$; $t = 80$ lbs per inch of face

$\beta = \frac{T}{t} = \frac{190}{60} \doteq 3''/2$

11 lbs pressure per handle

$\frac{1}{4}$

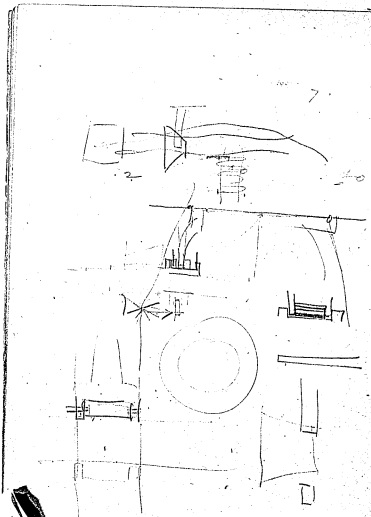


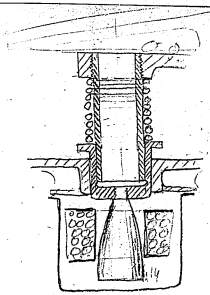
Screw 8" travel $\frac{1}{4}$" pitch

32 turns, 8" movement

(2" x 10") 2 gears

3 turns for reversing.

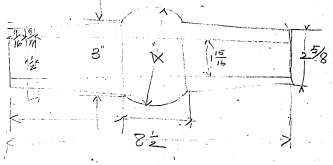




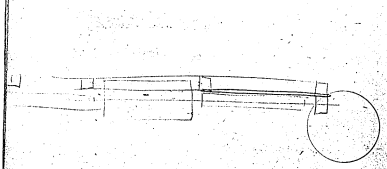
Oct 31. 89.

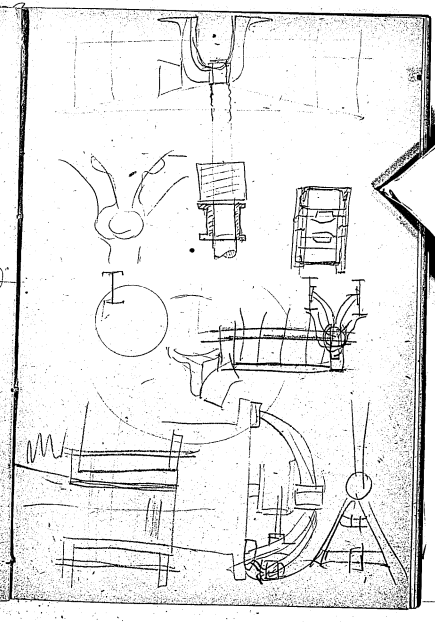
K

#6



Use an Regular Drop Hammer with a Frx Disengagement to be self foiling.





5280 x 7

31960

Calculating Spring

D. Mic .25

r = 2.75

G = 11000000

f = 15000

W = 300 lbs

δ 1½

δ

n = number of coils 10 coils

δ = 300

64.10.20.8

6400
20.8
5120
1280
133120
3
399360

71000000 .0039
11
39
39
429000
42900

399360 (9

429000)399360(9

$$4)\ \tfrac{1}{2}\ \tfrac{3}{4}\ \tfrac{3}{4}\quad W_1 = \frac{196\ f\ D^3}{2}$$

15000
.015
75000
150000
225000
196
13500
20250
2250
44100

.25

.015.625
25
78125
31250
.0039062.25

.0039

$$1.25 = \frac{\cancel{300}\ 64 \cdot 10 \cdot 17^3}{1100000 \cdot 3.75 \cdot 1.25}$$

$$1.25 = \frac{7^3}{1.25 \times 1100}$$

$$\frac{1.25}{1375}$$

$$1.25 = \frac{7^3}{1375}$$

$$\frac{1.25}{6875}$$

$$\frac{2750}{3.75}$$

$$7^3 = 718.75$$

$$7 = 9''$$

$$718.75 = \frac{64 \cdot 7^3}{64}$$

$$\delta = m \frac{64 m \cdot 7^3}{Q \delta^2}$$

$$1.25 = \frac{\cancel{300}\ 64 \cdot 10 \cdot 7^3}{\cancel{1100000} \cdot 3.75 \cdot 1.25}$$

$$\frac{5500}{1100}$$

$$1.25 = \frac{3.27^3}{1100}$$

$$\frac{1.25}{1375}$$

$$\frac{1.25}{6875}$$

$$\frac{2750}{3.75}$$

$$1.25 = \frac{300 \cdot 64 \cdot 10 \cdot 7^3}{1100000 \cdot 3.75}$$

$$r = \frac{64 \cdot 7^3}{1100}$$

$$1 = \left(\frac{64 \cdot 7^3}{1100}\right)$$

$$7^3 = \frac{1100}{64}$$

$$7^3 = 17$$

$$\frac{64)\ 1100\ (17}{\ \ 64\ \ \ \

$$\frac{\cancel{25}}{1.25} = \frac{\cancel{300}\,.\,64\,.\,\cancel{10}\,.\,73}{\cancel{11000}\,.\,\cancel{25}\,.\,3}$$

4400

$$1 = \frac{192.73}{4400}$$

25) 11000 (440
100
100
00

$$73 = \frac{440}{192}$$

192) 440 (

$$\frac{\cancel{10}}{1.25} = \frac{\cancel{300}\,.\,64\,.\,\cancel{12}\,.\,73}{\cancel{11000}\,.\,\cancel{375}}$$

2750

192) 2750 (14
192
1920
768

$$\frac{\cancel{5}}{1.25} = \frac{\cancel{300}\,.\,64\,.\,\cancel{12}\,.\,73}{\cancel{11000}\,.\,\cancel{125}}$$

2750

$$\frac{96}{288}$$

$$73 = \frac{2750}{288}$$

288) 2750.000 (9.7
2592
1580
1296

$$\frac{\cancel{54}}{1.25} = \frac{\cancel{300}\,.\,64\,.\,\cancel{14}\,.\,73}{\cancel{11000}\,.\,\cancel{25}}$$

24
168

$73 = 168$ 1375
1344

$73 = 8$
$8 \div 4 = 2$

$$W_1 = \frac{0.196 f \delta^3}{7}$$

$$W_1 = \frac{196 \cdot 20000 \cdot 0.015625}{4}$$

196
980
196
2940

$$W_1 = \frac{196 \cdot 20000 \cdot 0.125}{125}$$

980
392
196
0245000
4000

3) 980 (327
9
18
6
20

$$\frac{12.566 n f r^2}{60}$$

12.566 . 10 . 20000 . 25

12.566
45
62800
50264
565470

11) 5.654

12.566 . 20000 . 45

11000
550
275

12.566
45
62800
50264
565470

11) 56.5470

5.

3) 3.55 (1.

21
5
12000

12566 . m . f . f²

11000000 . E

12566 . ~~1.5~~ . ~~22000~~ . ~~225~~

~~11 000000~~ . ~~55~~

~~55~~
11

12,566

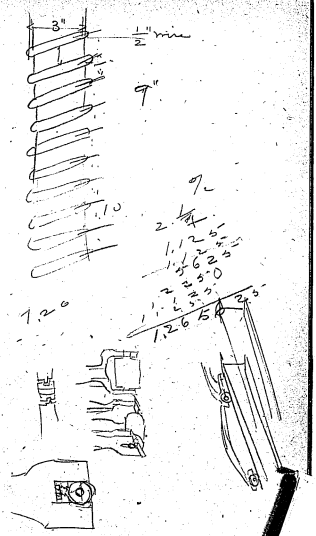
11.3094

11) 11.30

1.13

1.03 greatest extension

Compression



Nov. 1st 89

$$T = \frac{550\,HP}{V\ \text{feet/sec}} = \text{Tangential force}$$ see Nov 7th

$$v = 1.57 \times \frac{1300}{60} = 34\ \text{feet/sec}$$

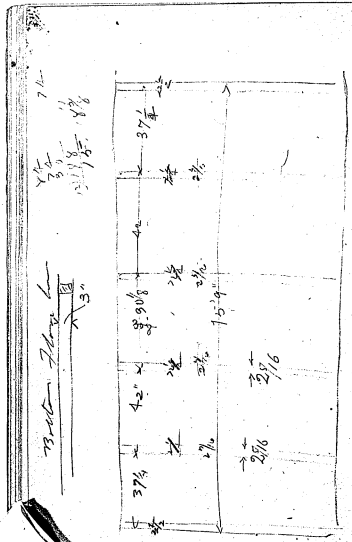
$$T = \frac{550 \times 8}{34} = \underline{130\ \text{lbs}}$$

$$P = \frac{T}{\mu} = \frac{130}{.2} = \underline{650\ \text{lbs}}$$

$$Q_1 = P \sin\delta = \underline{650 \times .139}$$
$$= \underline{90\ \text{lbs}}$$

$$Q_2 = P \cos\delta = \underline{650\ \text{lbs}}$$

1.350 / 35000



Formula ~~[illegible]~~ Calculation

609 lbs – 6 1/4"

900 lbs – 8 3/8"

2 1/4 dia 9 3/8

3/8 wall (200 lbs = 1.4")

~~[illegible]~~

15 cents

800

196 . ~~200000~~ . ~~.05~~

~~1,125~~

196

800

156,800

(.9) 156,800 (175 guaranteed)

D = 12'566 . mf e^2

$Q \, D^3$

12'566 ~~15~~ 200000 . ~~120~~ 42

(12'566)(42)(.8) ~~1,000,000~~ .375

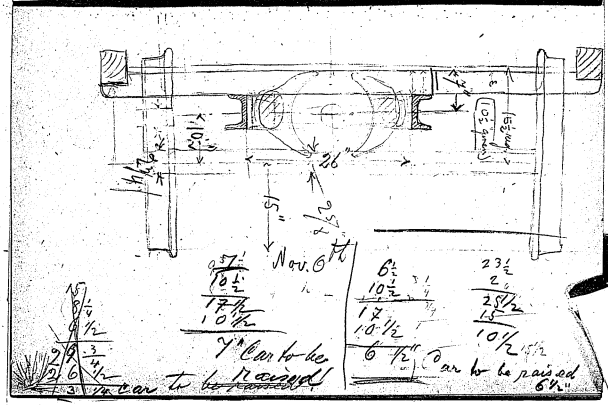
110 125

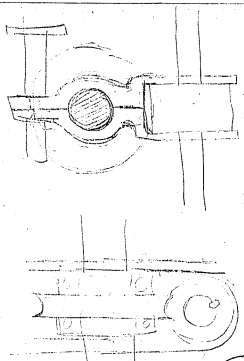
1,568.

137.5

(1.25)(110) = 13.75

1,2


26"
Nov. 6th
7" Car to be raised
6 1/2" Car to be raised 6 1/2"



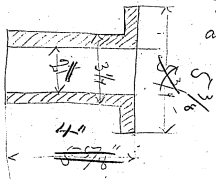
Nov 2 89

Rigs as gun Kennedy

34 X 22 X 18.

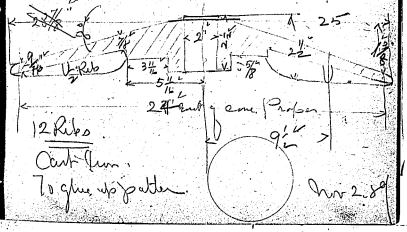
Finished all over

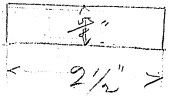
Changed Nov 6th



Bronze shell for paper cone on Street Car Motor

Nov 2nd 1889. K.



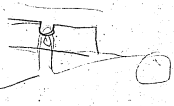


60 of these

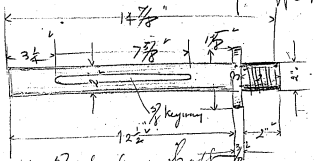
Steel rollers for S.C. Motor

D

5th Nov 89. R



Nov 5. 89. WB.



set 3/16 deep on shaft

Through this. Machine steel

Worm. Machine cutters

Minutes.

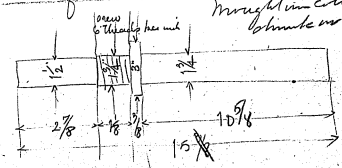


Fig this.

Machine steel. WB.

On the worm should be set the key and the keyway rounded off on edges.

$\frac{12 \times 60}{720}$

Pitch of screw: 1¼" dia

square thread:

$p = 0.16d + 0.08$

$= 0.16 \times 1.25 + 0.08$

$= .28"$

Make 4 threads to the inch $= .25"$ pitch

Power motion of screw.

Nov 5th 1911

Screw $1\frac{1}{2}$" dia

$\frac{1}{4}$" pitch

3 Seconds to stop the car from ~~[illegible]~~ miles speed

6 seconds to reverse motion between highest speeds.

Travel of paper cone $17\frac{1}{2}$" (16½ → 16 = 13th 89th)

Revols of screw $17\frac{1}{2} : \frac{1}{14}$

$= 70$ revol in 6 seconds

Revols of motor in 6 seconds:

$6 \times \frac{1350}{60} = 135$

Therefore Gears. $135 : 70 = 2.57$

~~Centre distance betw. gears = 9"~~

$$\cancel{\frac{R}{r} = \frac{2.57}{.57}}$$

$$\cancel{9 : 3.57 = 2.5}$$

$$\cancel{R = 6\tfrac{1}{2}}$$

$$\cancel{r = 2\tfrac{1}{2}}$$

Centre distance betw. gears = 8½"

$$\left.\begin{aligned} R &= 5\tfrac{1}{2}'' \\ r &= 2\tfrac{3}{4}'' \end{aligned}\right\}$$

Nov 7th

Tangential force.

$$T = \frac{550 \times P}{V\ \frac{\text{feet}}{\text{sec.}}} = \frac{550 \times 9}{38.5} =$$

$$v = 1.57 \times \frac{1350}{60} = 38.5 \text{ feet/sec.}$$

$$T = 130 \text{ lbs}$$

P.D. of cone $5\tfrac{1}{8}''$

$$P_L = \frac{T}{a} = \frac{130}{.2} = 650 \text{ lbs}$$

$$W_r = P_{pinion} = \frac{650 \times 1.39}{9 \text{ lbs on pinion}}$$

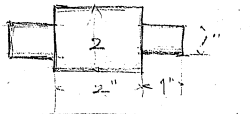
P. dia of pinion $1\tfrac{1}{8}''$
P. dia of gear 9"

Pinion $9'' \times x \text{ lbs} = 1\tfrac{1}{8} \times 100 \text{ lbs}$

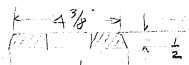
$x = 13 \text{ lbs}$ " 6 P. teeth

Continued page 52

Tom Ponger. Nov. 6 84

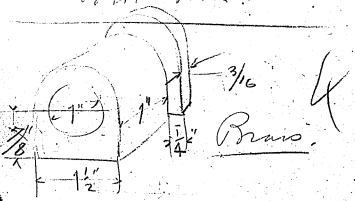


K.



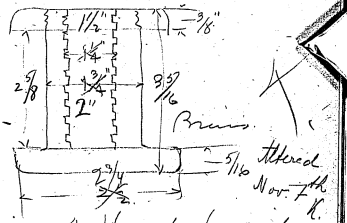
K

Brass Arm.



K

Brass.



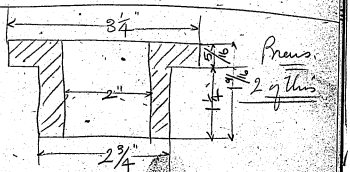
Brass.

K

Altered Nov. 7th

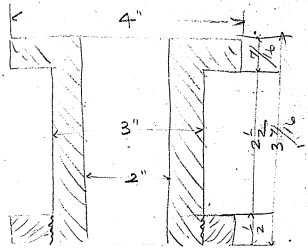
4 threads per inch

2 square of these with threads
2 without threads



Brass.
2 of this

NB. Nov. 6 84



2 y Chas. Brown.

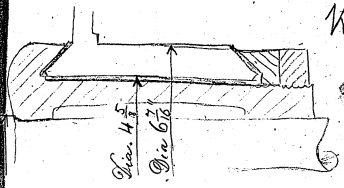
Finish all over.

Wt. hrs 6. 29

Nov 7th 89

Commutator 60 divisions

K.



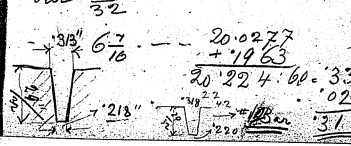
Inside dia. 4 5/8

Circumf = 14.53 ÷ 60 = .242

Mica .024

Bar ~~bottom~~ .218

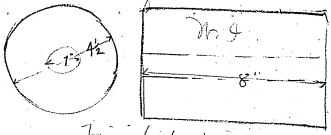
Outside dia. 6 7/16", depth of bar 29/32"



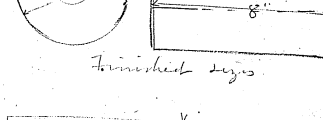
20.0277
+ .1963
20.224 : 60 = .337
.024
.31.3"

Mort. 8 of.

4 of this



Finished signs

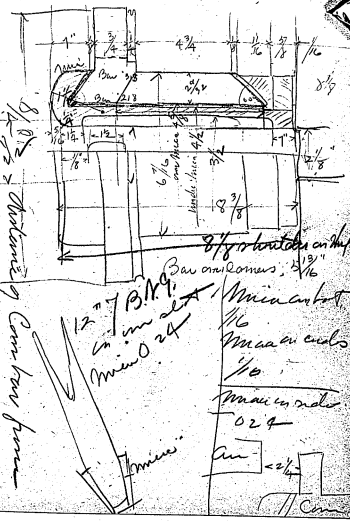


Finished signs

Hammer Finish

Use 2 #12 Brushes cement

Brush holders



Bill of Materials for Combination Frame

Annotated 2/14

Gears for screw-movement

$13^{lbs} \times .375 = \frac{24}{6} \cdot 6 \cdot 1^2 \times 200$ lbs. of 4 teeth

for rawhide

$13 \times 3/8 = \frac{1}{6} \times 6 \times \frac{1}{16} \times 200$

$6 = \frac{13 \times 3 \times 6 \times 16}{8 \times 200 \times 2} = 1\frac{3}{4}$"

made 1 3/4"

6 Pitch; gear p.dia: $5\frac{1}{2} \times 6 = 33$ teeth

" p.dia: $11 \times 6 = 66$ "

" p.dia $4\frac{1}{2} \times 6 = 27$ "

p.dia $9 \times 6 = 54$ "

Order given Mr B for 2 11/16 Pillow Blocks.

When here have 1/8" Lattum of 1 inch Making them 2 3/8 centre to field of face

MB.

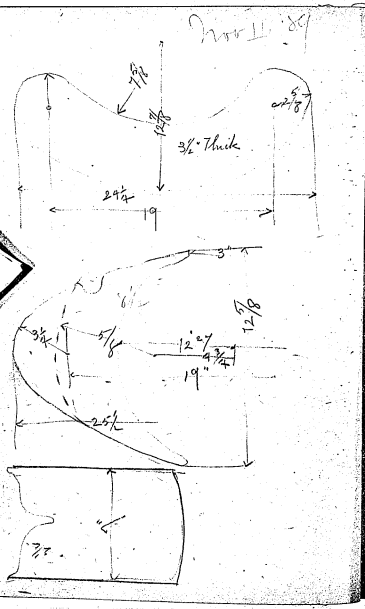
Order to Mr Thomas.

Nov 9th 89

2 Channel irons each 16 feet long, 5" high

~~25 lbs per yard~~

27 lbs per yd



Nov. 11.

To be made.

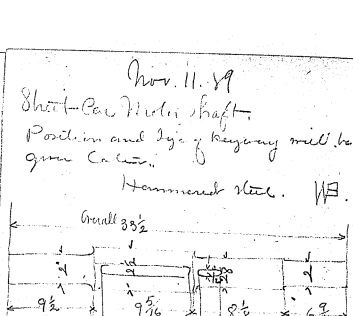
Inside bracket for screw box. behind Shaft.

Nov. 11. 89

Short-Car Motor Shaft.

Position and Type of Keyway will be given later.

Hammered Steel. WB.



Nov. 12. 89.

Number of Coils.	17
Diameter at ends.	2
Diameter at Middle.	3
Length over all.	7 3/4
Diameter of wire.	
Constant S.	20000.
Constant G.	11000000.
If wire is square.	
Side of Torsion	5/8 } ½ dia. circle.
" " Bending	5/8

W_1 = greatest safe shock limit

$W_1 = \frac{0.196 \, S^3}{\cancel{D}}$

$\delta_1 = \frac{12566 \, n D r^2}{G a}$ Corresponding deflection or extension.

3/4" [illegible]

160
800
4000
0'196 . 20000 . .42
125

320
640
6920
.196
41420
62280
8920
13562.20 lbs wgt.

.75
.75
375
525
66.25
.175
281.25
39375
72.1875
.422

5/8" diam 625

16000.
0'196 . 20000 . .244
125

244
16000.
1464
244
3904
.196
23424
35136
39104
765.184

Green 5/8 .306

3/4 × 1/2 .750

3/8 5/8 × 1/2

5/16

0'196 . 20000 . (15)³ .125 1250

20000
0'196 . 20000 . .125

.125
.78

400 lbs per spring
8 springs
3200

2000
.125
12000
12000
12000
39200
12 sets L. 20000 . .125

.78
.125
.15
25
12 sets
.78
(12.5) 9.8047
7/12 3 mch
100598
7/12 3 mch
Difficulties about 3 mch
Under Cost 4 hrs 8.7962
980.147

Make springs 5/8 × 1/2
11 coils.
Diameter 2
Inside 3
Length overall 8 1/2
coils per in 3/10 mch.

Carsprings Nov 13

11 coils.

Dia at ends 2" outside

" " Middle 3" outside

Length small 8½"

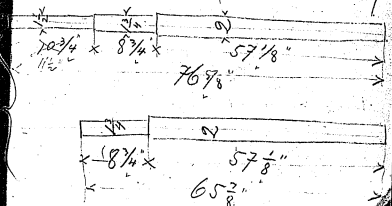
Coils spaced 3.

Material 5/8 × 1/2"

8 of this.

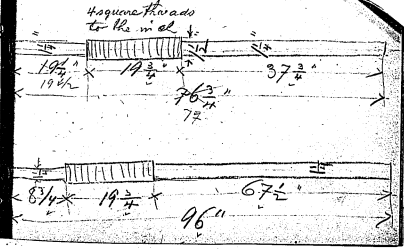
NB.

Main shafts Nov 13th 89



Screw shafts

4 square threads to the inch



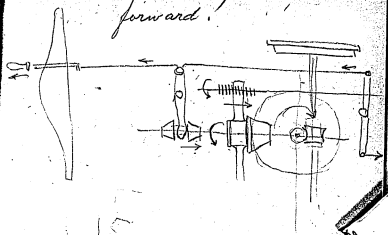
Ordered Nov. 13th

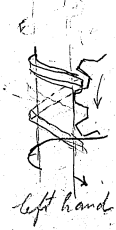
1 Wrought iron shaft 2" dia, 6½ feet long
1 " " " 2" " 5½ " "
1 " " " 1½" " 6½ " "
1 " " " 1½ " 8 " "

Ordered Nov 14 [illegible]
Lined from E M Shop, 6 #12
Hammered Iron Shaft

B.

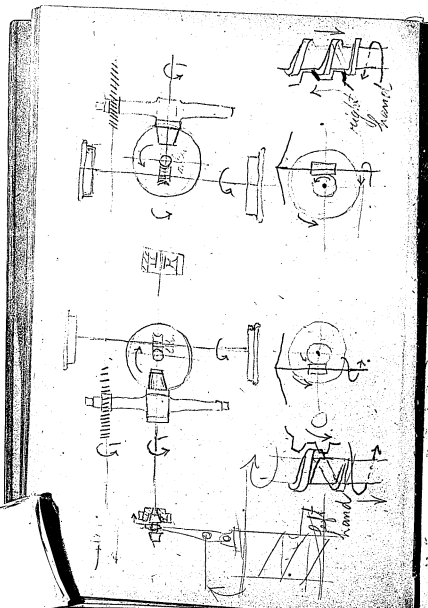
forward!





left hand

Armature shaft rotating in ~~opposite~~ direction as the hands of a watch in order to give a screw forward.



Nov. 18th 89

Approximate weight of parts:

Shaft	150 lbs		1960 lbs
Screw	70 "	2 main brackets	180
Hammel irons	270 "	4 screw "	128
Wood & brackets	32 "	2 end "	60
Parts of motor	135 "	Sundries	100
Rippers	325 "	Total	2528
Side pieces	190 "	Discs	220
Armature core	70 "	Bearings for shaft	100
Commutator	50 "	Brasses for worms	35
Arm wire	55 "		2883
Field "	100 "		
Fastening of arm	30 "		
2 pillow blocks	85 "		
2 bearings	60 "		
4 screw bearings	60 "		
" gears	60 "		
Levers and links	50 "		
Couplings	35 "		
Worms and gears	75 "		
2 Shafts & cone discs	27 "		
4 " & springs	30 "		
	1960 "		

Car springs

Car body 3000 lb

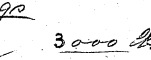
Motor 2400

5400 : 8 = 675 lb per spring

$$P = \frac{\sigma}{3R}\,\frac{b^2h^2}{\sqrt{b^2+h^2}}$$

Take $R = 1\frac{1}{8}''$, mean dia $2\frac{1}{4}''$

make



Vose Pageka'n spring

$$\frac{b}{h} = \frac{2.5}{1};\ b = 2.5h$$

$$675 = \frac{14000}{3\times 1\frac{1}{8}}\,\frac{2.5^2h^2\cdot h^2}{\sqrt{2.5^2h^2+h^2}}$$

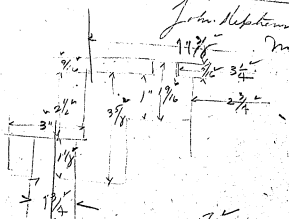
$$= \frac{14000}{3.375}\,\frac{6.25h^4}{2.7h}$$

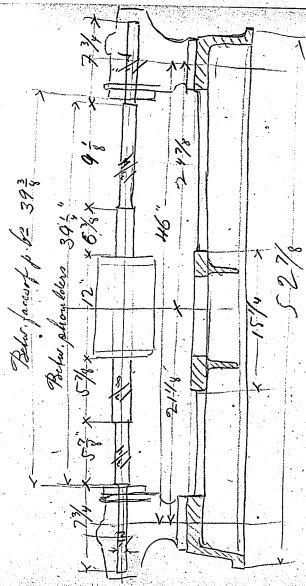
$$h = \sqrt[3]{\frac{675\times 3.375\times 2.7}{14000\times 6.25}} = .41'' \cong \frac{3}{8}''$$

$h = \frac{3}{8}$; $b = 2.5 \times \frac{3}{8} = 1''$

40 ft radius Curves Unless wheel base can be expanded to 7 ft. But with many curves about 27 ft radius the 6'3" base is quite enough.

John Hopkins Co.





Nov. 22. 1888.

Pinions for Mixer.

10" diad. Range m.

Bevel Gears.

159	7.	dia			Bd. Pin
~~Dia~~ 39	12.	4.37.	1 3/4 face		
160	12	3.875	1 3/4 "		3.25 "

Progress Machine Works.

a + 7 Pinions.

" 57 59 + 61 Lewis St.

60 62 + 64 66 Cannon St.

New York

P = 63000

77) 25 20000

63000

39, 3.5

26975) 50 47 60 (1.80

26975

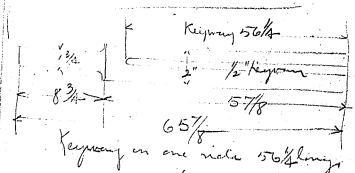
23450

21560

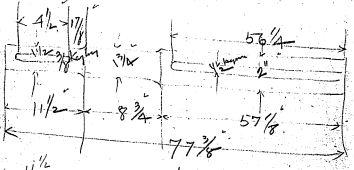
26

19 lbs. centrifugal force on the mm wheel at 77 R.P.M. and 8 P.

Nov. 25. 1889



Keyway on one side 56 1/4 long
" other side 1 1/2" long



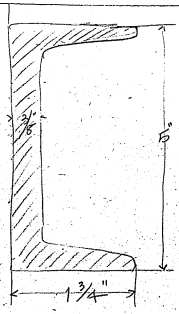
1 1/2
8 3/4
57 1/8
77 3/8

3/4

one keyway 56 1/4
opposite keyway 1 1/2 } long

Nov 25 1889

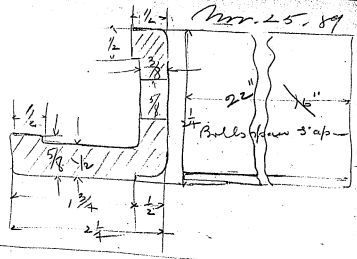
Centres of outside bearings. 12' 11 3/4"
Centres of disc brackets. 7' 7 1/2"
Centre of inside brackets 10 3/4 + 10 1/2
Total length 15' 11. (cross beams 2 1/2")
Distances between centre of beams.
37 1/4" - 42" - 30 1/8 - 42" - 37 1/4
26" between the parallel channels. inside dimensions.



84
7 5
91 1/2

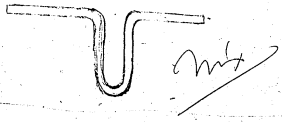
.98
9 1/2
10 1/2
1.02

Nov. 25, 89

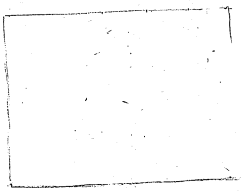


Nov 26 89

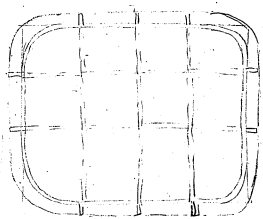
Mad. Mr. Arrick. in Pleasantville Shop

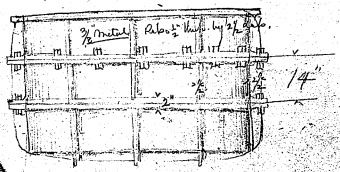


Monday Eve. Dec 2. 89.



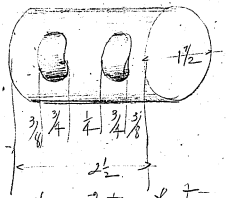
Monday Eng. Dec 24





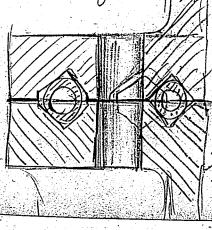
Monday Eng. Dec 2 - 49

3) 7/4 - 7



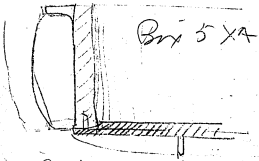
6 of this. 2 to each transformer.
9 - 1 1/2 Copper Rod

Detail of Flange Joint

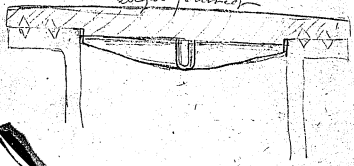


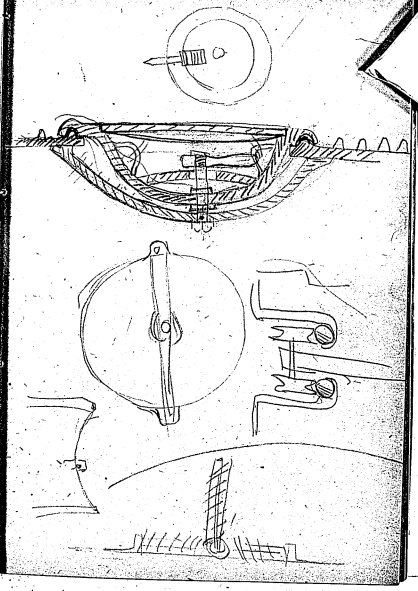
The bolt holes and dowels are cast in the pattern. The side Rods are loose pieces (and with the bottom) are [illegible] in their respective positions

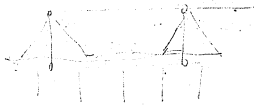
Monday. Eng. Dec 29

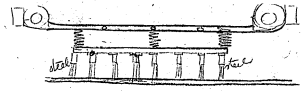


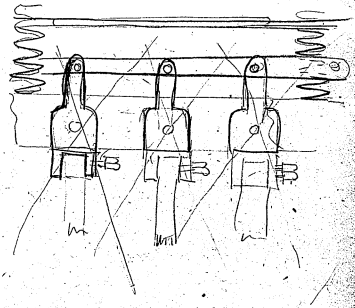
Bottom is a loose piece and merely formed for the bottom casting.

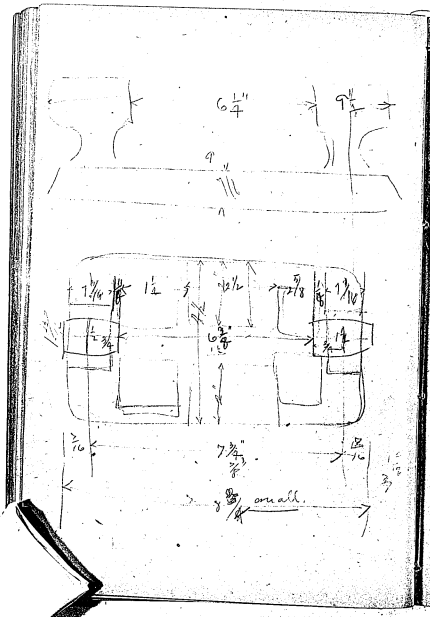


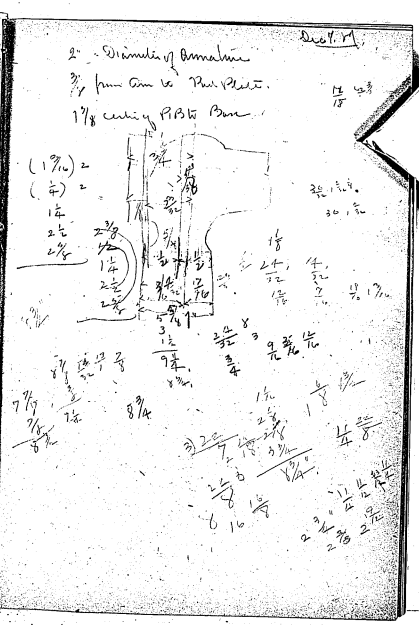




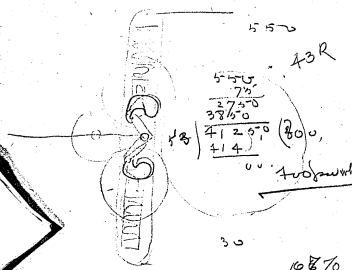





6 1/4"
9 1/2"
9"
1 1/16
1 1/2
1 3/8
7/8
1 1/16
1/2
3/4
6 3/8
1 1/4
7/16
7 3/8"
5/16
9 3/8" over all.


Dec 7. 91
2" Diameter of Armature
3/4 from Cam to Pivot Plate.
1 7/8 center of PB to Bore
(1 9/16) 2
(1/4) 2
1 1/4
2 1/2
2 3/8
1 3/8
2 3/8
2 3/8
1 3/8
5/16
3 1/2
9 1/4
7 7/8
7/8
8 3/4
1 1/2
1/8
3/4
2 3/8
2 3/8

10 1/8"



43R

40 pounds wheel

6770 Rev per hr

113 Rev per min

"5"

15.

P = pressure between the two wheels

μ = coeff. of friction

T = tangential resistance

$$P = \frac{T}{\mu}$$

r = relative pitch surfaces ft per sec

HP Horse P

$$T = \frac{550\,H}{V} = \frac{550 : 12}{r}$$

$$T = \frac{550\,H}{r}$$

163.

20 revolution

26 ft per min.

26.5 ft per min.

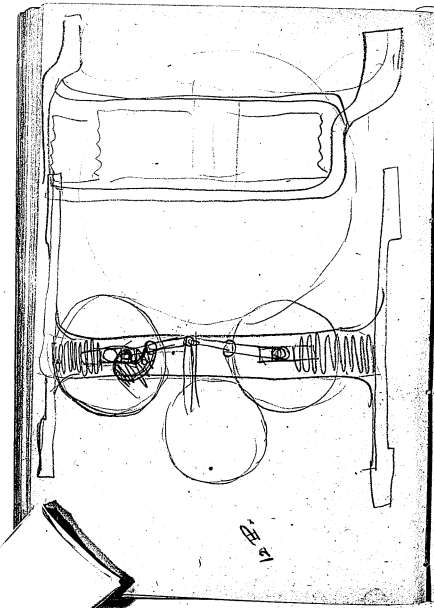
T = 250 lbs.

$$P = \frac{250}{.2} = \frac{N}{.2}$$

$$P = \cancel{500}$$

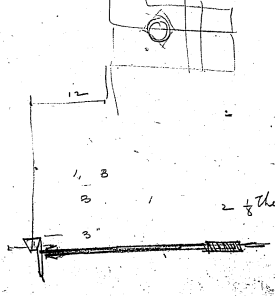
1246 lbs.

6.23 lbs per sq in



1/2 HP. 625 lbs per wheel

7½ HP. 1400 lbs per wheel.



Dec 9.84 Money for Prague Motor ~~Jenny~~ Fuselinechuteb

W_1 Prestressing force
δ_1 Compression deflection (in) inches

$W_1 = 0196\ f\ d^2$

$\delta_1 = \dfrac{12.566\ m f r^2}{Q\ d}$

$Q = 11{,}000{,}000 \cdot \frac{1}{4}$ Moment of I

250 lbs.

r = rad.

f = Prestress force in lbs

$f = 20000$ lbs.

$W_1 = \dfrac{0196 \cdot 20000 \cdot 052}{}$

$\dfrac{196 \cdot 160 \cdot 11760 \cdot 176}{31{,}360 \cdot 105}$

$\dfrac{160 \cdot 800 \cdot 20000 \cdot 052}{0196}$

$\dfrac{196 \cdot 160 \cdot 11760 \cdot 176 \cdot 31{,}360 \cdot 1052 \cdot 627 \cdot 2 \cdot 15680 \cdot 1{,}6307 \cdot 2}{1.4}$ (233.00

23 lb.

$\frac{3}{8}$ $\frac{1}{2}$ $\frac{1}{4}$

$\frac{36}{72}$

$1\frac{3}{4}$

$\frac{3}{8} = .375$

$.125 \cdot .140625$

$.052 \cdot \frac{2}{64}375$

$0196 \cdot 20000 \cdot (.375)^3$

$12.566 \cdot .5 \cdot 20000 \cdot \frac{1.53}{506}$

$.375$

$.375 \cdot 55 \cdot 1875 \cdot 10625$

$12.566 \cdot 1.53 \cdot 37698 \cdot 62830 \cdot 12566 \cdot 19225.98$

Absurdus.

$\frac{1}{4}$ 10.6) 19.22598 (1

1.75
3.0625
3.06

$0196\ f\ d^3$

5 Cubs.

$12.566 \cdot .5 \cdot 20000 \cdot 2$

$.375$

25.132

$.275)\ 25.132$

$0196 \cdot \cancel{20000} \cdot \cancel{1250} \cdot 1250$

$\frac{7}{8}$

$196 \cdot 1250 \cdot 7500 \cdot 1250 \cdot 245000$

245 lb

49

$\frac{0.196 \times D^3}{n}$

3)'375
'1875

0'196 . 20000 . '1875
1375

'0196 . 20000 . '08800

1660.00
'196
9960
14940 325 lbs.
1660
325360

$\frac{12566 \text{ in.} \times u^2}{4D}$

12566 . 20000 . 4 . 1
1000000 . '4375
275 2375
21875
30625
8750
12031 25

12031 25 | 12566 | 1.

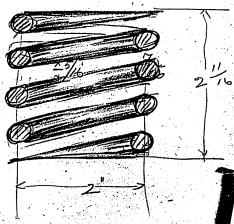
Yet forming ring Dec 9 1889

4 coils . 7/16 wire - coils separated 5/16 inches . 2" dia ~~outside~~ .

$\frac{25}{16}$
$\frac{15}{16}$
$\frac{43}{16} = 2\frac{11}{16}$ total lng.
$32\frac{11}{11}$

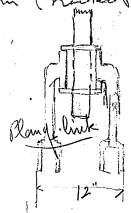
325 lbs. stretch a deflection of one inch

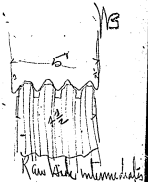
$2 \times \frac{15}{16} \cdot \frac{43}{16} = 2\frac{11}{16}$ length of form -

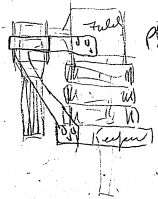


Dec 1 89

Holes commence 6½" outside center of main Bracket

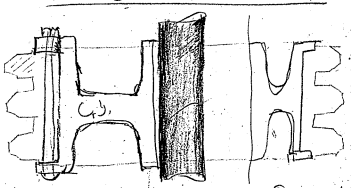




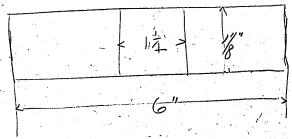


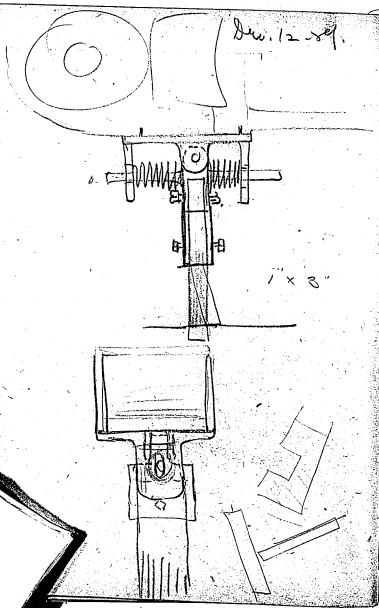
Plan of Bracket (Ideal form)

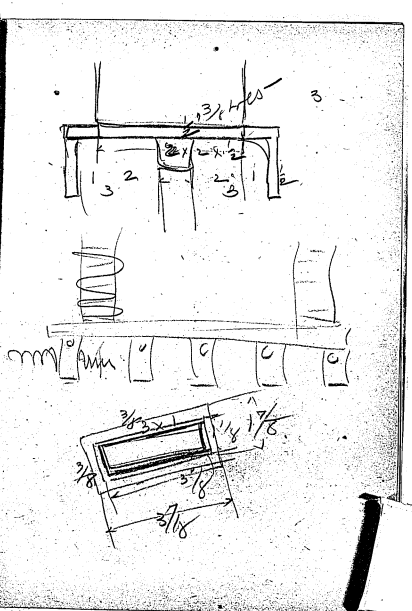
Sketch Construction Raw hide Gears.



Dec 11 89




Dec. 12 - 89.
1" x 3"


1 3/4 HCS
3
2 x 1 x 1/2
1
2
3
2
3
1
1/2
3/8 x 1
1 1/8
1 7/8
3/8
3 1/8
3 7/8

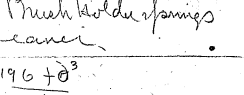
Dec 12-84 Brush holder springs
for hack cleaner

$V_1 = \frac{0.196 \pm 0^3}{T}$

$D_1 = \frac{12566 \; mm^2}{9d}$

196 . 20000 . 015

7840
39200
7840
117600



6 coils.

12566 . 25

275 . 20000 . 5275 37698

196 . 20000 . 015

196
4000.0
784

0.196 ± 0³

196 . 40000 . 00024

7840
31360
15680
187160

1.8 lbs.

7840
.086
47040

12566 . 25

550 . 275
3750
1250

41.25 87.962

196 . 8.00 . 005

160.0
196
960
1440
160
31360

31.35

12566 . 6 . 5625

550 . 1475

1/2

$\frac{0196 f d^3}{N}$ - $\frac{12.566 M f A^2}{Q d}$ $\frac{f}{Q} = \frac{1}{550}$

.0228 m²

d

Spring. ½ mm.
7 coils.
1½ diam.

1875

.022847
550
11460
1145
12.5960

550) 12.56 (.02284
1100
1766
1650
4660
4400
2600
2200
4500

.390625
1.75

Cap. .0228 . 8 . 39.56

.2579

.2273
.0228
2184
546
546
.062244

.062 (.03
39
.0228
3136
784
784
.089376

25 . .0229 (.85
25) .089 . 4

7/4 1875
2 1/2
37/4

.19) .102 (½ .1012144

.125 mm

.0228 m. 1" Auto

.0228 . 78 . 25 . 4.561
125
125

2 3/8
1/32

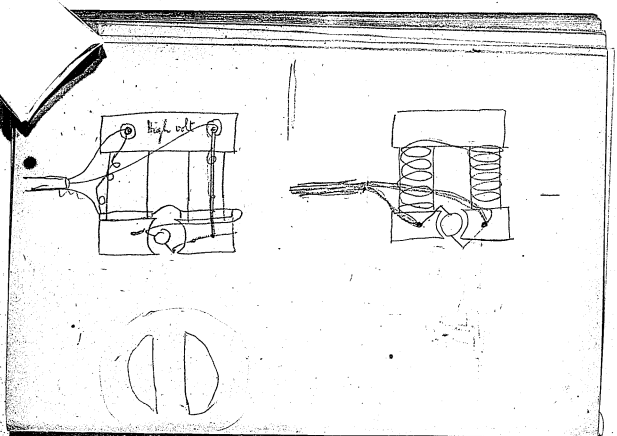
196 4000 .00L
N

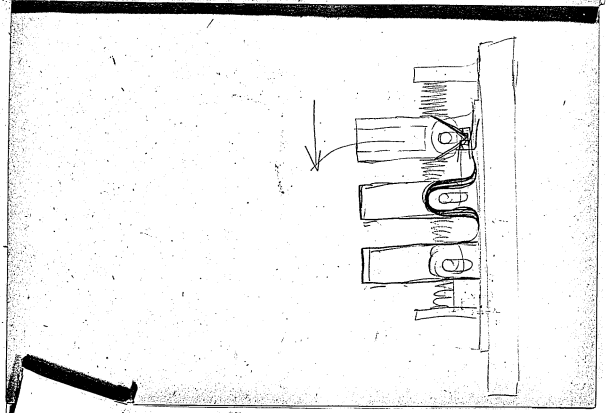
16680 81.100

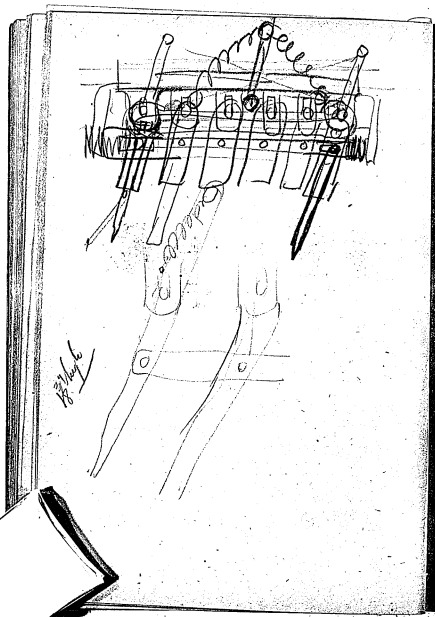
.196 f d³
N

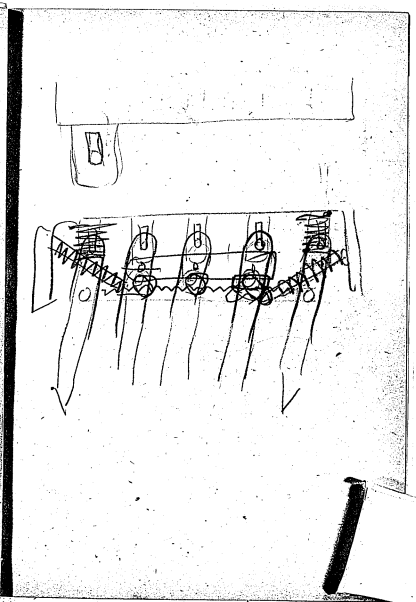
To this 3 - line.

Ze Nrie
Z. Rhinebow
Nunn
Dc Pmmcuda Ent.
Ze Ze
Ze
Ze


high volt

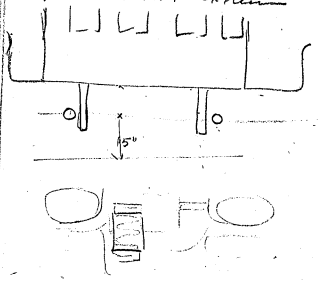






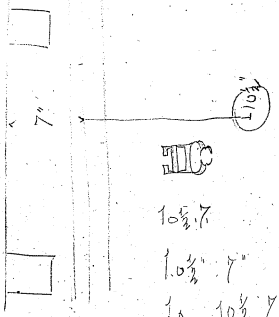
Dec. 19. 19.

2½" movement exhibition



10⅞" 7"

10⅞" 7"



10⅞" 7"

10⅞" 7"

10 10⅞" 7"

Dec. 19.

Operation
Fuse Primer

Nos pieces forming,
Cutting up and of Nos 1 & 2

3/16 plate

Impact Nut 3/4 Bore

1 1/2

4"

3/4

one of these

New Sheet-Car Motor, Jan 8 1895

1 1/8

1/8

No

1/8 11/16 9/16

1/4

9/16

3 1/2

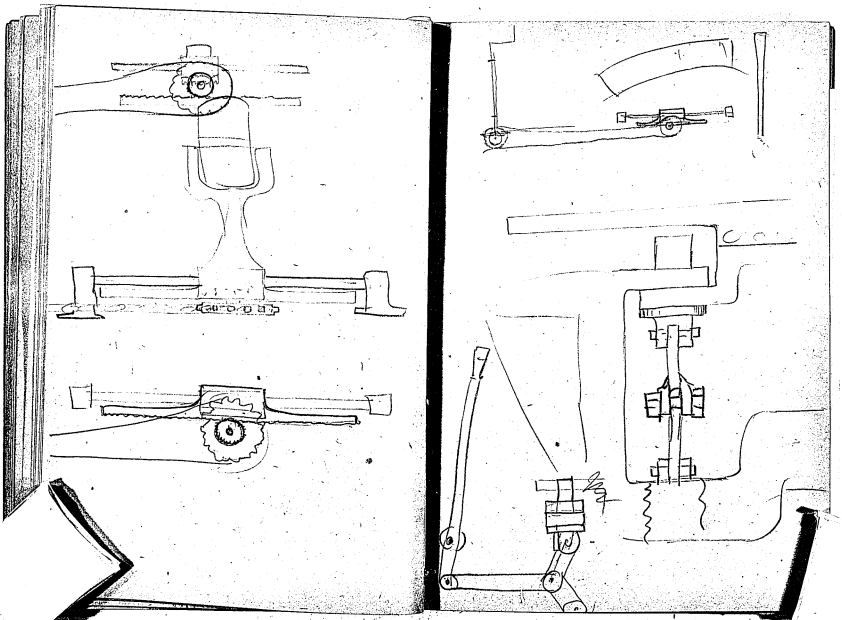
2 1/2

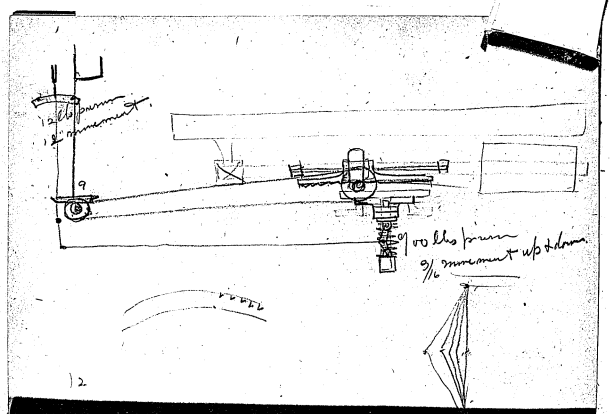
3 1/2

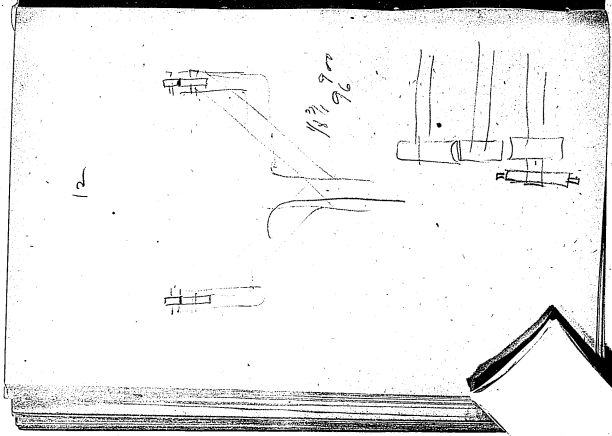
31"

17

11




12 lbs pressure
1/2" movement
9
10 lbs pressure
3/16 movement up & down
12


1/8 x 1/8
1

.1274
3.00
89.1800

2) 89.18
44.

8) 127
.7
$\boxed{889}$
77

$60 \times 10^3 \times 119 = 357000$
67×3000 90000
447000 / 2000 = 223

.127 ohms per ft
.3500
6350
381
.44450
44 ohm resistance

100.

$\frac{100}{4.5} = 22\frac{1}{4}$ amperes.

Nov 8th 19

~~Motor Generator~~ Generator K.
100 Volts $\frac{1}{4}$ amps.
20 " 1 amps.

$Z = 30 \times 10^8 \times \frac{E}{N \times n} = 10^8 \times 30 \times \frac{119}{N \cdot n}$

Armature ~~24~~ 28 divisions
Winding 1# 32 Bare ~~28~~ Times around
insulated wire 1390 feet " 32 Bare
~~resistance = 40 Ohm~~
Ohm

Drop in armature $= \frac{1}{4} \times \frac{43}{4} = 11.8$ Volts

Revolutions = 3500 per minute

$Z = \frac{10^8 \times 30 \times 111}{60 \times 3500} = \frac{10000 \times 30 \times 111}{6 \times 35}$
$= 1600000$ lines

160 000 : 20 000 lines/sq inch = 8 sq cm

~~3/4 × 1 7/4 = 1·9 × 4·5~~

3/4 × 1 7/8 = 1·9

4·8 × 1·9
432
9·12

8·2

Dia. of arm above body
1 1/4"

Bore 1 11/16" ; Cast iron reckin

~~3/4~~ × 1 3/4 = 1·6 × 4·5
270
80 000 : 270 =

leakage 20% ; total flux of lines

160 000
32 000
192 000 : 9 000 = 21 sq cm = 10 sq cm

Dia. of core

160 000 : ~~18 000~~ =
32 000
~~176 000 : 18 000~~ = 10 sq cm
192 000 : ~~18 000~~ 10
10 : 6·45 = 1·55
355
330

dia. of core 1 7/16"

Magnet winding
Air space 1/4"

circ. 2·75 × 1 7/8 = ~~4·08~~ sq inch
= 30 sq cm

~~30 × 16~~ =

Resistance of air space

$R_a = 0.76 \frac{0.6}{30} = 0.014$

Resistance in wrought iron

6" = 15 cm length

$1.6 \cdot 2.9^{in} \times 6.45 = 10.4$

$R_w = 0.00085 \times \frac{15}{10.4} =$

Between shoulders 6¼

length of bearing 1¼

Area of annulus outside

Wm Buckingham

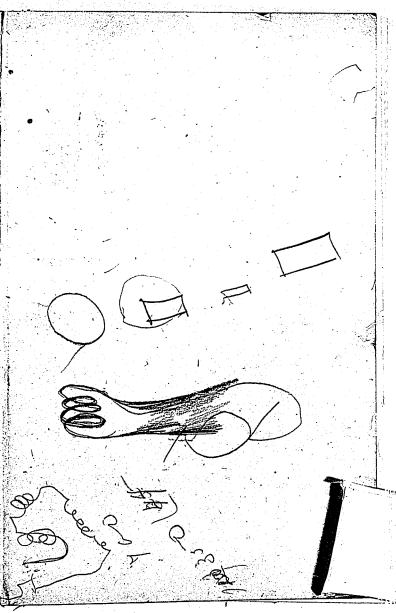
Chaus Observing

$$\begin{array}{r} 746 \\ \hline 3730 \\ 5 \\ \hline 3730 \end{array}$$

$$\tau_0 = \frac{R}{q}$$

r = external curve

Diameter of Core $1\frac{7}{16}$"

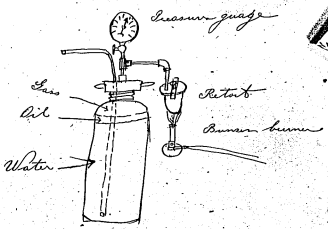


Notebook, N-89-11-07

The two dated entries in this notebook are from November 1889 and September 1891. The book was used by John Ott for notes and a drawing regarding an "Experiment on Chemical Engin[e] for Phonograph." There are also several drawings relating to lamp and transformer experiments, and one newspaper clipping on the Baldwin Locomotive Works. The spine is labeled "100." The pages are unnumbered. Approximately 30 pages have been used.

I. Syrian Asphalt
First in retort. Residue labeled I A.
Large quantity produced in large retort.
Boiled in open pan. I O. P.
I Th Liquid is residue from benzolestheriz of I a.

Experiment on
Chemical Engin for
Phonograph Nov 7. 89



Chemicals used to make pressure
then absorb by cooling of

Carbonate Lead

over

~~Iodide of potash~~

Carbonate Iron

Salmonac Slack Lime

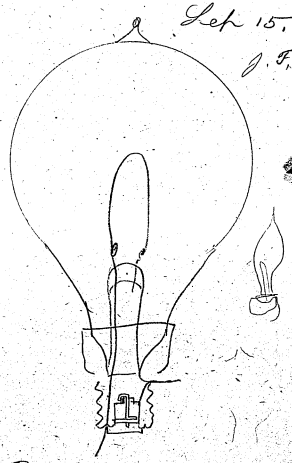
Sulphate Potass Acedic

Cocunut Charcoal

Amonia Aqua

Sept 15. 91

J. F. O'H



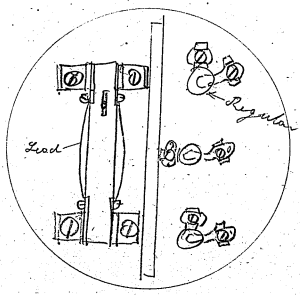
Cutout dash pot

worked by air suction

II. Prince Albian Asphalt
Boiled in open pan and bottled large quantity (1574) in large stock
I residue
1) Soluble in Naphtha
2) " " Benzol

Cut out for transformer

Lef 9.1



IV. Good for path
An soluble in CS_2 44
Ba in $(C_2H_5)_2O$

A KING OF THE RAILS.

Making the Largest Locomotives in the World.

The Baldwin Locomotive Works are about to begin work on five engines for the Erie Railroad that will be the largest ever constructed in the world. They will weigh 177,000 pounds, or eighty-eight tons, and will be used for hauling heavy freight over the mountains.

There has just been completed at the works the largest compound locomotive ever built. It is for the fast freight service of the New York, Lake Erie & Western Railroad. The Baldwin Company urged the road to try one of the compound engines, and built the engine mentioned as a sample, along with forty-four single expansion engines. The latter are now being put to a careful test as to their capabilities and economy of running. When the compound engine has had a week or ten days' breaking in a careful test will be made of its working in comparison with those of the single expansion engines.

The ordinary engines have cylinders 20 by 26 inches. The compound engine in question has high pressure cylinders 14 by 26 inches. The big compound engine is in other respects similar to ordinary engines. It has three pairs of driving wheels, 63 inches in diameter. The weight of the engine in working order is 165,000 pounds, exclusive of the tender. The weight on the driving wheels, which is the measure of the power of the engine, is 77,000 pounds.

The boilers of all are Wooten type, and the fireboxes are 114 inches long by 96 inches wide. The engine is 56 feet long and 16 feet high. It is expected that this engine can be run at a saving of from thirty-five to forty per cent over the single expansion engine. The Baldwin Company is now building ten engines of a similar type for the Reading Railroad, five for the Pennsylvania and two for the Lehigh Valley.

V. Rock fossil resin, southern islands,
Louis Kestlock, Phila.

Is soluble in Benzol

51% organic matter.

H. Coal tar pitch

Bitumen pan

1) soluble in chloroform

2) " $(C_2H_5)_2O$

3) " Naphtha

4) " Benzol

5)

III. Albumen

IIII. Castor oil

1.) ~~schwammiger Rest~~
spongy residue, insoluble

2.) the same after melting soluble
in SO_2.

IIII A_2 / IIII A_1, Distillates.

I IX. Olive oil

I. Linseed oil

XL. Cotton seed oil.

XL

XII. Bees wax

XIII. Гарач war

XIV. Carnauba wax

XV Ауыл Бөлімінің

11

XVI Sugar (Caramel)
Boiled in pan. (Abbott)

XVII. Glycerine

~~Bichromate~~ Flexible, tough, black resin ca. 20% of the $C_3H_5(OH)_3$.

1.) Benzol (ca. 5%)
2.) CS_2 (7%)
3.) $(C_2H_5)_2O$ (15%)
4.) CH_3OH (5%)
5.) $CHCl_3$ (55%)
6.) CH_3COOH (7%)
7.) Insoluble (8%)

No. 5 Treated with solvents ~~yields~~
1.) Turpentine (oil of)
2.) Toluol
3.) strong Ammonia
4.) hydrate of potash. yields a body soluble in Ammonia and alkalies insoluble in acid. Most part of it being humic acid.

Glucose

~~XIII.~~ Black Ogobeuke

~~XX~~ Myrtle wax

XXI Crude Anthracene

XXI

XXII. Obearine

XXIII Balsam Copaiba

XXIV Balsam Tolu

XXV. Hard cubian Asphalt.

Boiled in pan.

Residue extracted with

1.) Alcohol

2.) Ether

3.) Naphtha

4.) Benzol

5.)

XXVI. Humic bodies

Hamers soil (Bitter peat) is extracted by weak caustic ammonia, after filtration is made a precipitate with quicklime. This precipitation contains:

$C_{54}H_{96}(NH_2)_2(COO)_6Ca_3$
$CaSiO_3$ (and polysilicates)
$CaSO_4$
$Ag_2Mg_2(PO_4)_2$
$CaPO_4$

} principally traces from $Ca(OH)_2$ or

After decantation and filtration

This precipitate is decomposed by boiling with weak hydrochloric acid, sufficient to make the liquid ~~too~~ acid, stirring and decantation and filtrated. The Remainder (after good washing) is again dissolved in weak ammonia and evaporated. The solid mass is tested for ashes, and if necessary boiled with weak hydrochloric acid (after filtration), washed, dissolved again and again evaporated. The product should be $C_{54}H_{96}(NH_2)_2(COO\,NH_4)_6$ containing only traces from mineral substances.

This "Humidoxamark of ammonia" is a black weak mass, somewhat flexible in small pieces, but too brittle for insulation purpose.

A weighted quantity of this is then boiled with just enough glycerine to perform the Ester $C_{54}H_{96}(NH_2)_2(COO\,C_3H_5)_6$. With addition of a little excess of ammonia this Ester is performed on simple boiling the liquids and evaporating the ammonia. This gives a flexible varnish mass, burning without any ~~flame~~ smoky flame like hydrogen, which the more ammonia's salt is decomposed at higher temperature without giving a remarkable flame at all.

Notebook, N-89-12-13

This notebook covers the period December 1889-August 1890. It was used by Arthur E. Kennelly, Charles Batchelor, and an unidentified draftsman (probably George Mayer) as a rough record book in the Galvanometer Room. The book contains notes, drawings, and calculations regarding magnetic belts for power transmission for the electric railway. Transcriptions of some of these records can be found in Arthur E. Kennelly Notebooks #2 and #3. There are also entries relating to conductivity tests on copper and tin-plated wire, along with various other electrical experiments. Transcriptions of this material can be found in the two Kennelly notebooks. The front cover is labeled "#577." The pages are unnumbered, and some pages have been removed from the book. Approximately 80 pages have been used.

Only the material not transcribed in the Kennelly notebooks has been filmed.

2. 1.90

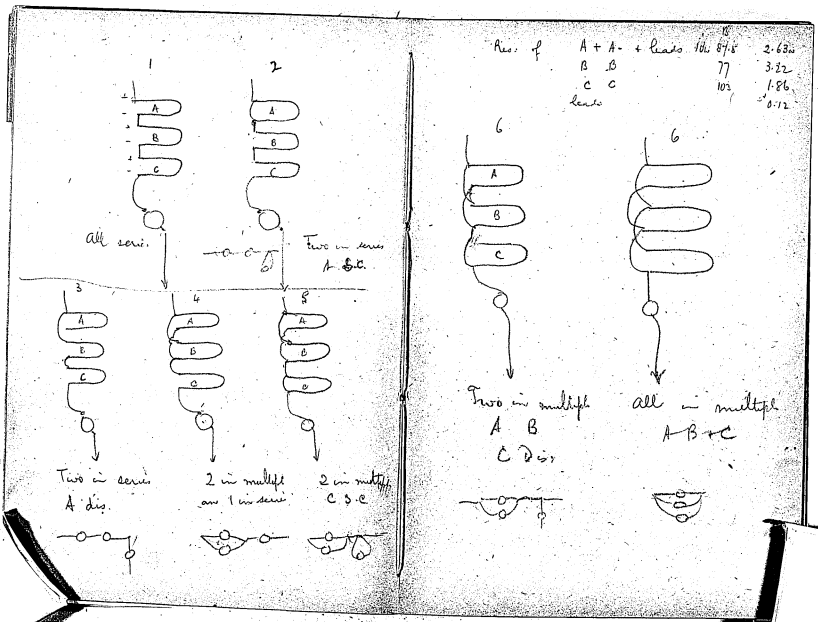
Whole res with leads 1 - ~~106 / 194 0.54~~

1 0.1w 103 A 253 / 47 0.54
2 103 A 16

1 all res. with leads 1w A 116
2 112
3 106
4 99
5 89
6 74
7 49
8 lost coil 2
9 2 1w 0.1w { B45 / 103 A }
10 72 A
11 —
12 56 A
13 —

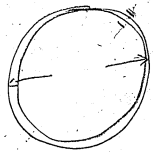
7.45
6.69
5.82
4.77
3.76
2.90
1.94
0.99
0.51
0.29
0.20
0.04

1460 - revs 20.5 volts
975 tach.


1
2
A
B
C
all series
Two in series
A & C
3
4
5
Two in series
A dis.
2 in multiple
on 1 in series
2 in multiple
C & C
Res. of
A + A- + leads
B B
C C
leads
87.5
77
103
2.63
3.22
1.86
0.12
6
6
Two in multiple
A B
C Dis
all in multiple
A B + C

110 volts	1	640	560
	2	760	680
	3	760	700
	4	780	720
	5	960	920
	6	960	900
	7	1100	1080

2.63 finish $3\frac{1}{64}$ outside



$3\frac{3}{64}$
2.63

2.38
2.42

2.40
2.38
2. Then the rubber must be

O.D. $2\frac{63}{64}$

I.D. $\frac{242}{64}$

$$\left(\frac{E - cw}{b + \beta w^2}\right) cw = W$$

$$Ecw - c^2w^2 = W(b + \beta w^2)$$

$$w^2(W\beta + c^2) - Ecw = \mp Wb$$

$$w^2 d - Ecw = -Wb$$

$$w^2 - E\frac{c}{d}w = -\frac{Wb}{d}$$

$$w^2 - E\frac{c}{d}w + \frac{c^2}{4d^2}E^2 = E^2\frac{c^2}{4d^2} - \frac{4Wbd}{4d^2}$$

$$w - \frac{c}{2d}E = \frac{\sqrt{E^2c^2 - 4Wbd}}{2d}$$

$$w = \frac{cE}{2d} \pm \frac{\sqrt{E^2c^2 - 4Wbd}}{2d}$$

$$= \frac{E\varphi n \pm \sqrt{E^2\varphi^2n^2 - 4Wb(W\beta + \varphi^2n^2)}}{2(Wb + \varphi^2n^2)}$$

when $b = 0$ $\quad w = \frac{E\varphi n}{2\varphi^2n^2} = \frac{E}{2\varphi n}$

Suppose $E = \varphi^2n^2w$

$$w = \frac{\varphi nw}{\varphi nw} = \frac{w}{w}$$

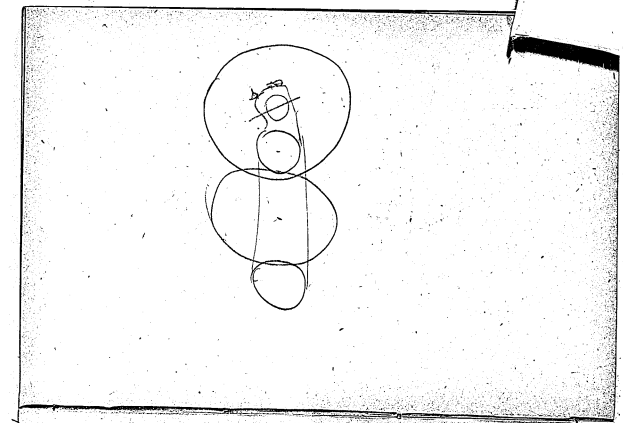
Efficiency of the system is $\frac{c}{E}$

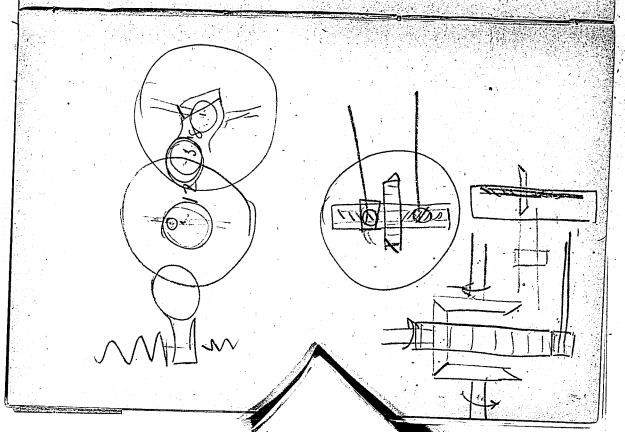
$$\frac{dW}{dw} = \frac{4E\varphi nw - \varphi^2n^2w^2}{b + \beta w^2}$$

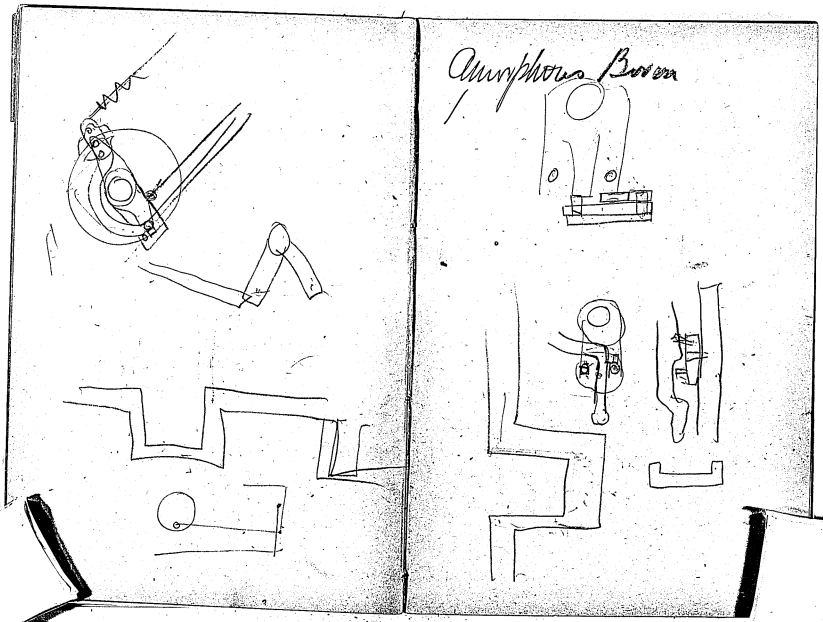
$$= (E\varphi n - 2w\varphi^2n^2)(b + \beta w^2) - 2\beta w\,(E\varphi nw - \varphi^2n^2w^2)$$

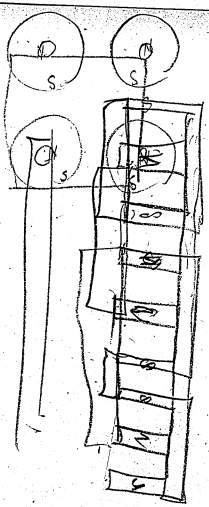
$$\therefore (E\varphi n - 2w\varphi^2n^2)(b + \beta w^2) = 2\beta w(E\varphi nw - \varphi^2n^2w^2)$$

$$w: \quad (E - 2\varphi nw)(b + \beta w^2) = 2\beta w(Ew - \varphi nw^2)$$






Amphorus Boxer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S
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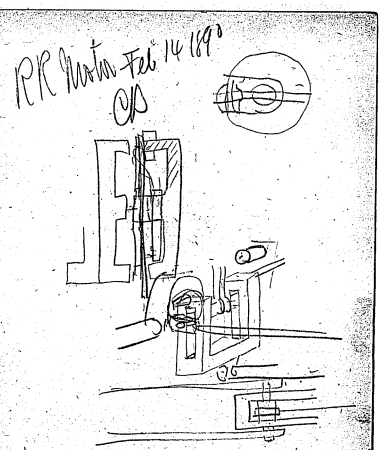
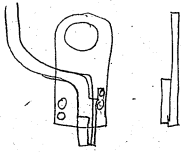
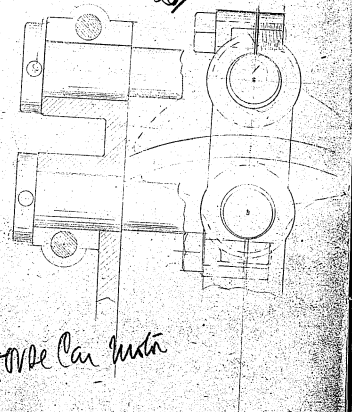
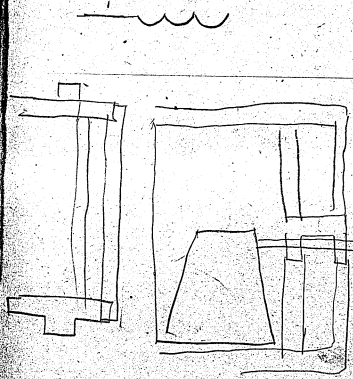

PR Martin Feb 14 1890

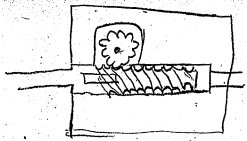


Device for adjusting jaws on horse car
February 15th 1890

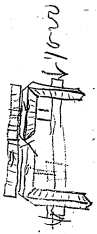




Horse Car Mfgr



Rotary Pump



$\frac{1}{2}$

$\frac{1}{2}$

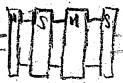
100
5
100
5
100
3
28
Bow 0 news
100
0
50
15
5
20

14th 1890

Wm Magnetic Belt-

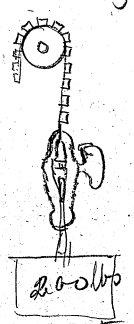
A device for increasing adhesion of belting by means of a shut-steel belt of .006 thickness and 2 ply— 3/4 inches wide with 1/4" square iron pieces riveted on outside 3/4 of 1" apart—

the Pulleys are Magnetic and turned with annular grooves for winding.



the belt with the Iron bars on the outside completes the Magnetic circuit giving an enormous grip.

Test a 4" Pulley with belt 4" wide and contact of 1/2 the circumference of Pulley sustaining about 200 lbs



Making transmission of Power by belting nearly as positive as Gearing &

running practically frictionless
an endless belt on magnetic
Pulley of 4" diameter and
3/4 face driving Magnetic
Pulley of 12" diameter
In test - belt was run
at about 1400 ft per minute
but could not stand the
strain of bending around 4"
Pulley

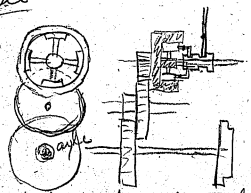
Belt weighs 13 lbs
and has 2.2 c faces

Weight of Breaki
on scale at 8 ft from
centre 49 Pounds

Aug 13th 1890

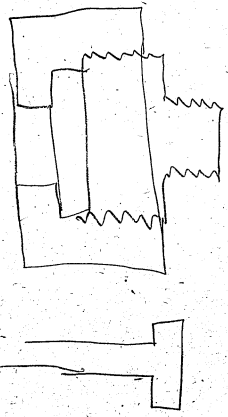
Centrifugal clutch applied to street-cars

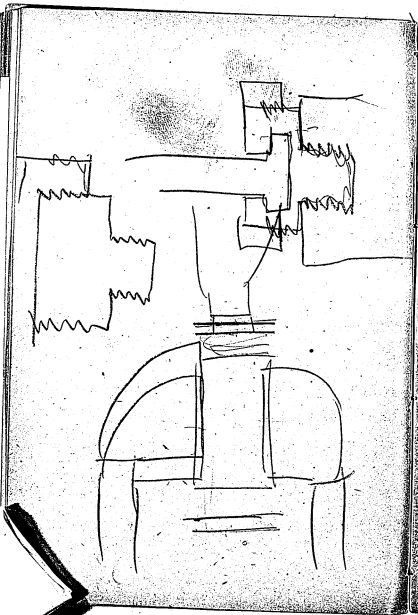
A device for starting and running street cars by means of a friction clutch that works automatic by centrifugal force, the device is attached to the armature shaft of the motor and gearing to the axle

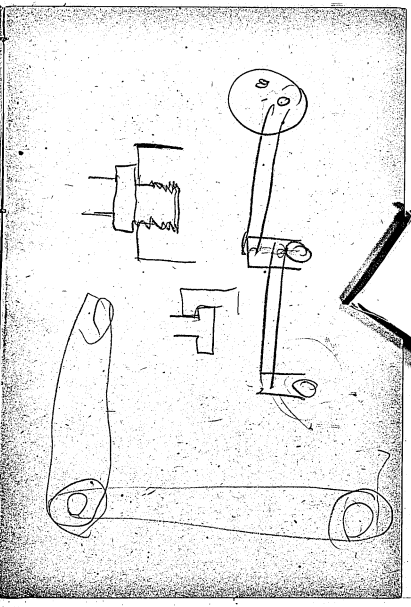


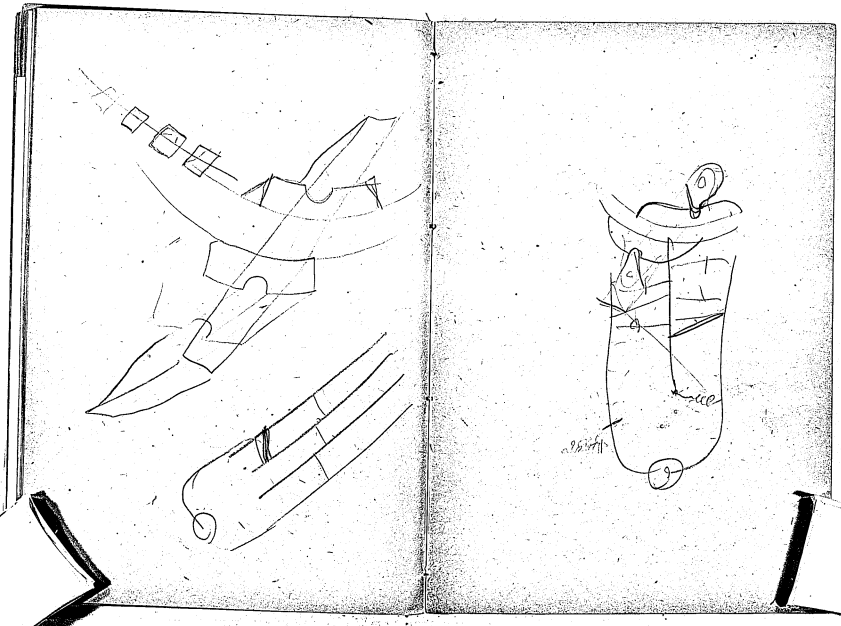
the fields of motor being

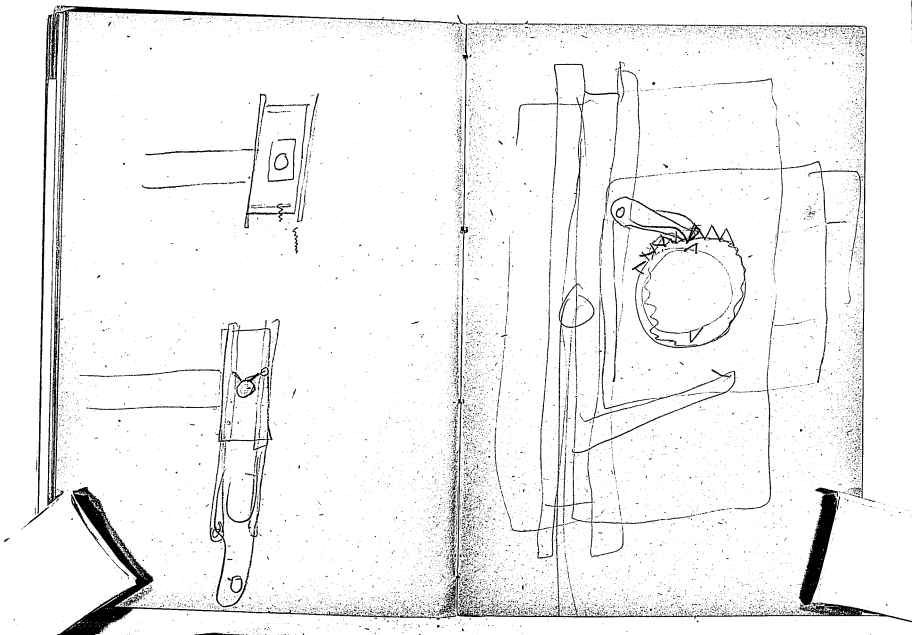
strengthened allowing
the Elevation down to
comparatively slow speed
and the clutch is with
drawn by means of lever
and the car stops. and
forcing the lever there is
enough force in the jaws
to grip to start the car
the speed of motor now
drives the car. Having the
gearing at 2 1/4 miles per
hour and any increase
of speed must be due to
Motor a test of this
showed that a car could
be handled on 16 per
cent gradient —

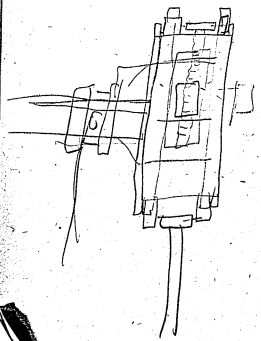


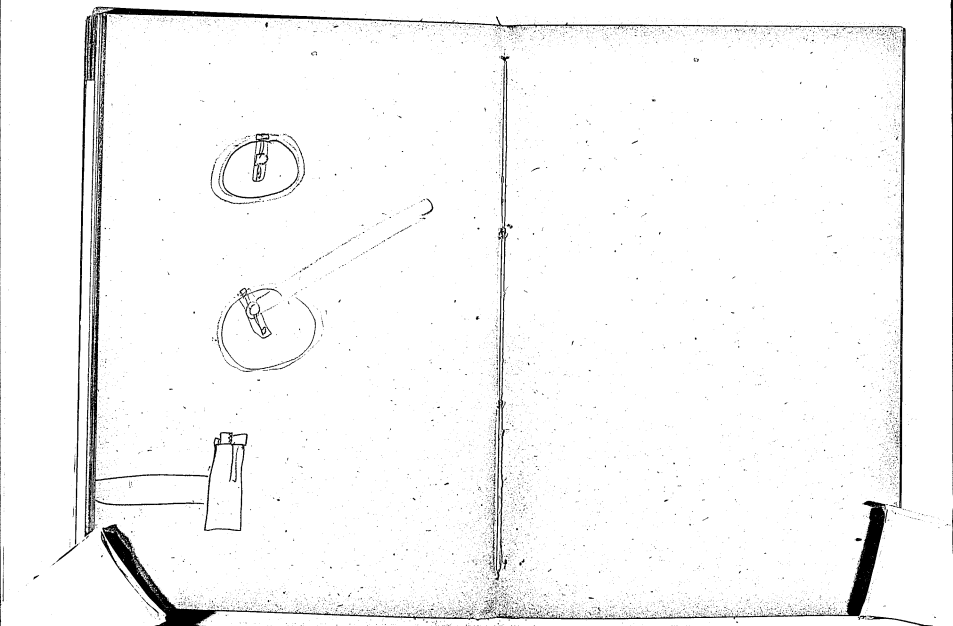


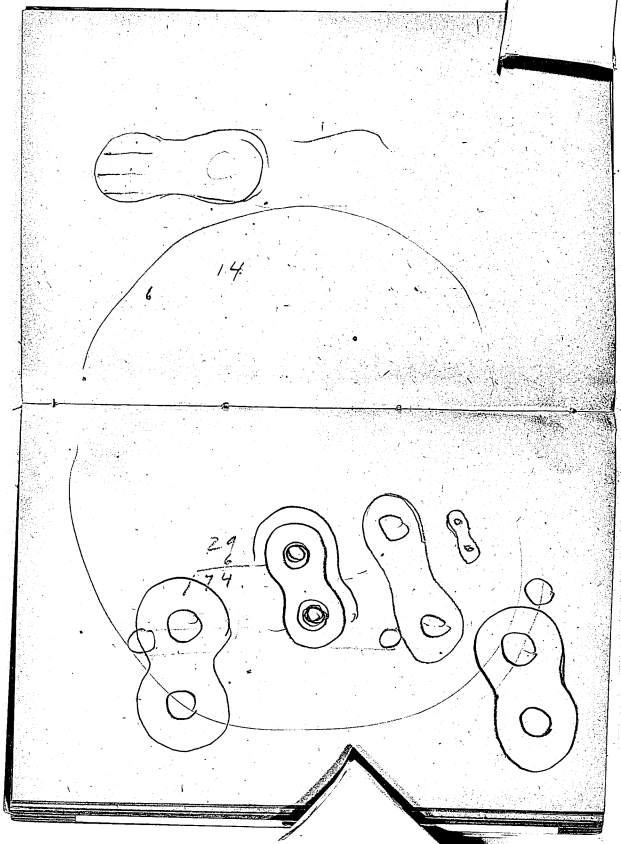


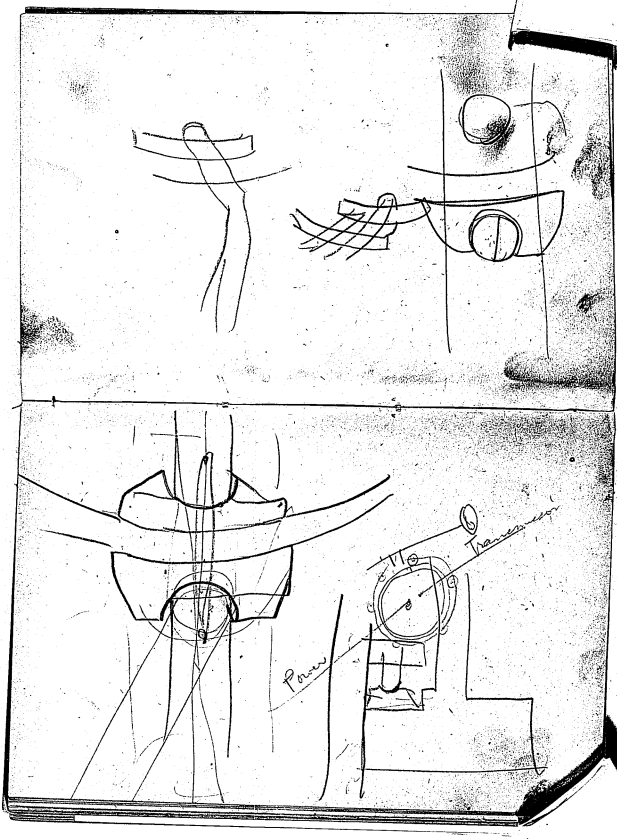









14
6
29
6
174

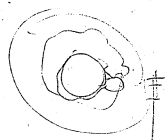

Transverse
Prow

250

700
12

700
63

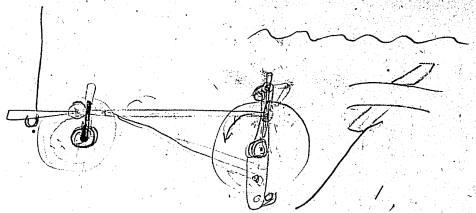
700
60
4200



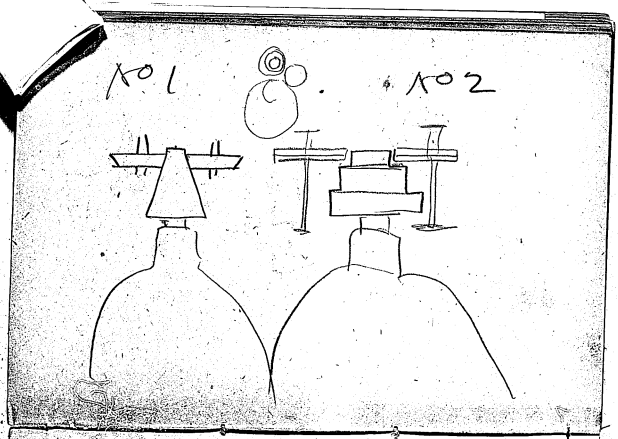
70

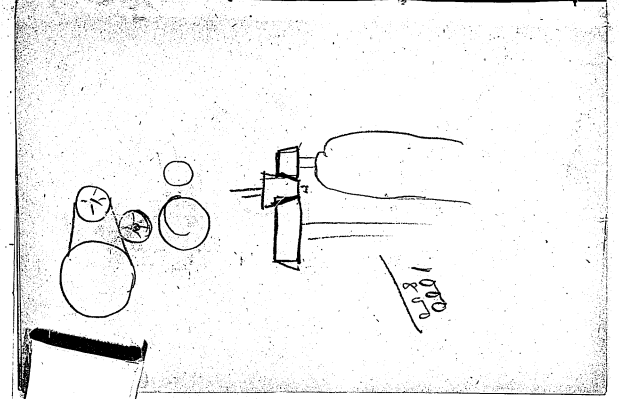
90
15 strokes

× 70 = 1050



24 — 310


No 1
No 2



Weight of Magnet
6 lb 3¼ oz

Notebook, N-89-12-31

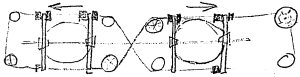
The dated entries in this notebook are all from December 1889. At the beginning of the book are eight drawings by Charles Batchelor regarding the electric railway. The remainder of the book was used by an unidentified experimenter, probably during 1888, as a shelf list for laboratory equipment and chemicals. The spine is labeled "64." The pages are unnumbered. Approximately 40 pages have been used.

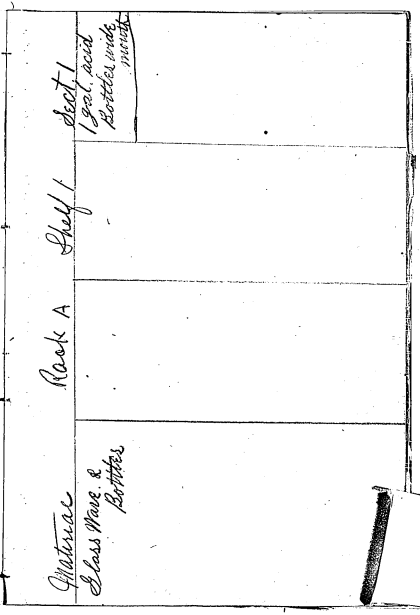
Only the electric railway drawings have been filmed.

Dec 31st 1889

R.R. Car.

Cone shifting device -



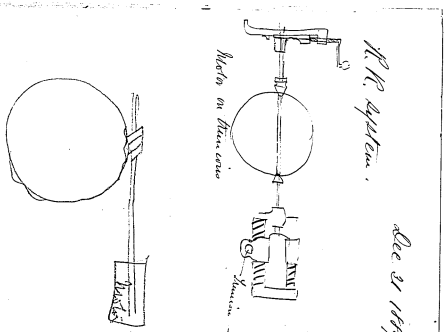


R.R. Martin

Dec 31st 1889

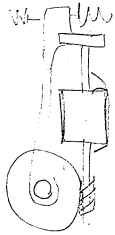
Method of running - Lifting cone & running

Material of	Sect. 1	Sect. 2	Sect. 3
Mech. Co. Shelf #1 Bottles.			

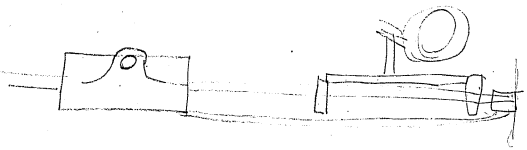


Material	Rack A	Shelf 1	Sect 1
Glass ware and Bottles			1 gal acid Bottles wide mouth.
	Rack A	Shelf 1.	Sect. 2.
			1 qt. Bottles wide mouth ground glass stoppers.
	Rack A	Shelf 1	~~Sect. 3~~
			Assorted wooly Bottles 2 and 3 necks

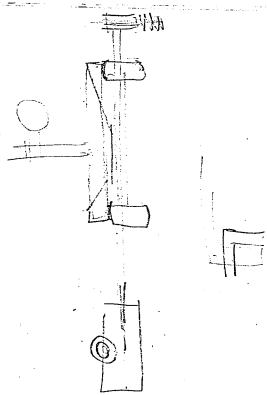
Material	Rack A	Shelf 2.	Sect 1
Bottles			1/2 gal. acid. 1 qt. acid Bottles wide mouth
"	"	"	Sect. 2
			1 Qt. Bottles small neck. ground stopper
			Sect 3
			Woulfe Bottles 2 and 3 Necks.



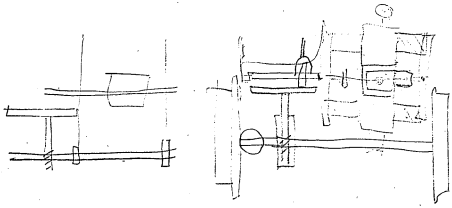
Material	Rack 8.	Shelf 3.	sect 1
glass, ware. and Bottles			1. Pt. Bottles Wide mouth
			Sect 2.
			4 oz. Bottles wide mouth
			Sect. 3.
			assorted woulfe Bottles 2 and 3 necks



Material	Rack A	Shelf H	Sect. 1
Glass ware. Bottles			1 Pt. Small neck. ground glass stopper Bottles
			Sect. 2.
			8 oz. Wide mouth Bottles
			Sect. 3.
			Homeopathic vials Small Bottles ½ oz. and 2 oz small neck glass stopper,



Material	Rack #	Shelf:	
Bottles.			Sect. 1 8 oz. Bottles ground glass Stopper Wide and narrow, mouth.
			Sect 2 2. oz. Bottles Wide mouth.
			Sect. 3.



Material	Rack A.	Shelf 6	Sect 1
Bottles			1 Pt. Acid Bottles glass stopper small mouth
			Sect 2
			1 oz. Bottles wide mouth

Notebook, N-90-01-08

This notebook covers the period January-May 1890. It was used by Arthur E. Kennelly and Theodore Lehmann as a rough record book in the Galvanometer Room. The book contains notes, drawings, and calculations regarding battery tests; the use of hydrogen as a rust inhibitor for steel; the use of a phonograph motor for sewing machines; insulation experiments; measurements of the magnetic permeability of iron; and various other electrical experiments. Transcriptions of these records can be found in Arthur E. Kennelly Notebooks #2 and #3. Two pages of notes relating to an "Experiment on the Production of Electricity by passing Coal gas upon spongy Platinum" have not been transcribed. The front cover is labeled "#588." The spine is labeled "105." The book contains 189 numbered pages.

Only the notes on the coal gas experiment have been filmed.

Jan. 8. 1890.

Experiment on the Production of Electricity by passing Coal gas upon Spongy Platinum.

Took solution of $PtCl_4$, added NH_4Cl until no more $(NH_4)_2PtCl_6$ was precipitated, filtered, heated precipitate to redness on a sheet of Mica, to expelle NH_4Cl & Cl.

Around this mass of Spongy Platinum I coiled about 12" of thin bare copper wire ~~# 28 B&S~~. The ends of the wire were placed into circuit with Galvanometer, a current of Electricity was passed through this wire and the Galvanometer, the deflection observed, the ends of the wire coiled around Pt reversed and deflection observed.

A jet of Coal gas was directed upon the mass of Pt, and the deflection observed also with reversed ends of wire.

The following table will show the results of this experiment:

Progress of Current	Wire Coil Spring Pt.?	Einhail · Galv. Difference with Coal gas Resistance		Difference with Coal gas Resistance		Glash Galvan. Difference with Coal gas Resistance		Difference with Coal gas Resistance		
		Ohms	Amps	Ohms	Amps	Ohms	Amps	Ohms	Amps	
1 cell of Daniell's Battery	12"	100 = 2.88 = 0.230 amp.	2.80 = 0.220 amp.	100 = 2.70 = 0.270 amp.	2.75 = 0.276 amp.	0.216 = 0.00026 amp.	0.212	0.202 = 0.000507 amp.	0.202	In these gases directly upon the wire, it began to glow and then conc.
8 cells of Indo-Battery	10"	#17 Bring				thick coal 1.21 = 0.605 amp.	1.21	1.205 = 0.605 amp.	1.205	Indo-Battery [illegible] experiment.

The jet of Coal gas was allowed for about 10 minutes before turning upon the Platinum.

The small interruption of Current observed in directing the Gas upon Pt and bringing it to red heat is very probably due to increase of resistance by temperature.

Notebook, N-90-02-06.1

This notebook covers the period February-May 1891. There is also one entry from February 1890. It was used by one or more unidentified experimenters for notes and calculations regarding ore separation and assays, chemical analyses of stearic acid, experiments with chlorine, and tests of lubrication for a small motor. The front cover is labeled "594." The spine is labeled "108." The book contains 93 numbered pages, beginning with page 101; the first 100 pages have been removed from the book.

Only the material relating to ore separation and lubrication experiments has been filmed.

Iron Magnetic Ore.

$23\frac{3}{10}$ cc permanganate = 100 cc of (500 cc iron solution = 2 gm ore)

23.3
.00866609 Fe in 1 cc
2077
1398
1398
1864
.201799897 Fe in 23.3

23.3 cc = .201 iron.

$\frac{5}{1.005}$ " = 2 gm ore
$\frac{50}{50.25}$ = % iron in

iron may with separation:

1st 23.3 cc
~~2nd 23.3 cc~~
3rd 27.3 cc

23.3
21.3
44.6 | 2
22.3

22.3 cc per manganate = $\frac{1}{5}$ of ore.
2 gm ore = .96565 Fe = 48.282%

Weight of Platinum crucible, 27.1785 grams.

Crude Iron Ore.

24.8 c.c. of Permanganate Solution = 5/8 grams Iron Ore. = 53.69 %

5 grams ore dissolved in solution, residue 4.2227 grams was reduced to colorless solution

2nd 29 cc of Per manganate solution = ~~20~~ 1/5 of 2 gram ore.

1.2545.80 Fe in two grams. = 62.79 %

was reduced to violet

5 grams of ore dissolved in 2nd 100 cc of iron solution : residue = 2.893 grams

---

Was reduced to beginning of violet.

25 7/10 cc = 1/5 of 2 gram ore.

5 grams ore
3.9 grams

Reduced by H_2S 100 cc of the 500 cc of iron solution = 23 cc permanganate = 1/5 of 2 gram ore.

Weight of residue of zinc from 5 grams, 3.900 grams.

5th 100 cc iron solution, allowed to reduce completely (12 hrs.)

$29\frac{4}{10}$ cc = $\frac{1}{5}$ of 2 gm.

Then from $29\frac{4}{10}$ – 23 cc for iron contained in 5 gm zinc =

$27\frac{4}{10}$ cc = iron + titanium

23 cc for iron in $\frac{1}{5}$ of 2 gm –

$4\frac{4}{10}$ cc = titanium in $\frac{1}{5}$ of 2 gm

---

magnetic alteration.

at complete reduction by zinc

zinc used = 5 gm –

" remaining = 1.081

zinc consumed = 3.919

29 cc standard sol = $\frac{1}{5}$ of 2 gm –

2nd Reduced by H_2S

25 cc standard sol = $\frac{1}{5}$ of 2 gm.

Non magnetic.

at reduced complete by zinc

20 cc = $\frac{1}{5}$ of 2 gm –

noticed the violet dust here after 6 cc had been added,

zinc used 5 gm.

" ~~consumed~~ 4.118

" consumed .882

2nd by H_2S

$11\frac{1}{2}$ cc = $\frac{1}{5}$ of 2 gm.

Manganese

Magnetic sample –

.019375 Mn_3O_4 in 5 gm ore

.27 % Mn

Weight of zinc residue 1.001 grams

Standardizing for manganese solution for titanium.

20 cc = ~~.1500 grams~~

$\frac{.6 \text{ cc iron in the zinc used for reduction}}{19.4}$ = .1500 gm titanium oxide

1 cc = .0347 gm titanic acid = .02115006 titanium

Magnetic separation

Wt of Pt crucible in Ti determination estimation = 27.1565600

ash = .0083775

27.1556825

Crucible + fusion + fusion = 27.2251

27.1568

Titanium oxide in ½ gm. .0683

which contains .0148 Ti

TiO_2 in ½ gm. = .0235

TiO_2 in 1 gm. .0470

Ti in 1 gm ore = .0.5248

Ti in 100 gm = 0.5248

Experiments on a New Lubricant for the Small Motor.

#1 Melted napthalene and added ordinary Machine oil (Lard Oil) not very stiff.

Percent napthalene 71%
" oil 29%

#2 Melted napthalene and added lard, much stiffer than #1

Percent napthalene 66%
" Lard 34%

#3 melted napthalene and added a compound consisting of 20 parts albany grease and 1 part lard oil better than #1 & 2

Percent Napthalene 60%
" Compound 40%

#4 Melted napthalene and added compound in #3 Better than any other.

Percent napthalene 50%
" Compound 50%

#5 Melted Albany grease and added napthalene

Weight of albany grease 5.3 gr
Weight of dish and resultant mixture 11.2 gr
Weight of dish 11 1/2 gr
Weight of napthalene
Percent
" albany grease
Probable percent of napthalene 50%

Caustic Soda ~~13.1~~ 13.2

100 c.c Alcohol, used in each case.

100 c.c. Alcohol — 13.5

14 c.c solution

alcohol =

H 21

2 gms sample

100 c.c. Alcohol,

31.2
13.8
31.8 – 14

0.106389 × 17.4 =

4258856
74 4723
106389
1.85.11.68 4
92.5584 3 %

H 22

2 gms sample

100 c.c alcohol,

49.2
31.8
49.6 – 4

.106389 × 17.4 = 92.5584 %

#23

2 gps sample
100 c.c. Alcohol

67.4
49.8
67.8 − .4

106389 × 17.6 =
106389
174
638334
744723
106389
1.87246464
93.62232%

#24

2 gms sample
100 c.c. Alcohol

85.0
67.8
85.4 − .4

106389 × 17.2 =
17.2
212778
744723
106389
1.83998908
91.9945%

25

101.2
2.4

2 grams sample
100 c.c. alcohol

103.0
85.4
103.4 - 4

.106389 x 17.6 = 93.622232%

26

2 grams sample
100 c.c. alcohol

41.6
24.0
42.0 - 4

.106389 x 17.6 = 93.62232

#27

2 grams sample

100 c.c. alcohol.

22.4

4.6

22.8 — x

.106389 X 17.8 =

.106389

178

851112

744723

106389

1.893724 2

94.6862 1 %

Table of equivalents of c.c. in grs. (230)
of oxalic acid for samples sent
from Tulare Lake. Solution being a standard
NaHO solution of 1.015 sp.gr., 1 c.c. = 0.106389 g.

#6 Lubricator
May 11 - 189
2 parts Lard (Old No 7)
1 part Tallow
2 % of bulk of caustic soda
4 ozs Lard
#72 ozs Tallow
.82 oz Caustic Soda = ~~[illegible]~~ 1/10 2
used 13.5 grams sodium Hydrate
10.2 grms caustic soda solution
of 1.201 sp gr
Too much soda

#8 56 grams lard
28 grams tallow
17.5 grams caustic soda solution
containing 13% caustic soda, =
1% of the 84 grams.
Too much soda,

#9 56 grams lard
28 grms tallow
8.75 grams soda solution containing 13% caustic soda = 0.5% caustic

#10 56 grams lard
56 grams tallow
8.75 grams solution of NaOH

#11 10 grams P 10
10 grams naphthalene, quite a good stick

#12
100 parts Albany Grease
25 parts naphthalene
10 parts tallow

Notebook, N-90-03-14.1

This notebook covers the period March-November 1890. Most of the book contains routine ore analyses by John V. N. Dorr, Samuel Blan, and Charles W. Platt. Included are assays of a New Zealand ore submitted by Sir John Pender. There are also notes by Platt regarding experiment no. 353, tests of an electric traction motor. The front cover is labeled "#602." The pages are unnumbered, and the book has been used in both directions. Several pages have been removed from the book. Approximately 180 pages have been used.

Only the notes relating to experiment no. 353 have been filmed.

N-90-03-101.1

#602

John Dorr

~~Pin 90~~

Paul Blanc

June 17/90

Chas W Platt

Sept 1890

Pie 2

1033
87
1120

35
35
17
87

87
87
174

17
17
35
17
52
52
104
35
9

.2827) .1650 (.58
1413
2420
2261
159

Fe 56
2 112
OH 17
6 109
221

.2827
.2289
.6598

112 : 221 = 116 :
116
221
116
232
232
2560 (.2289
224
320
224
696
696
1000

no g. only!

353 © W Plate

Short-cam motor -

analogous of result on nine wire.
Cannot be exposing to fumes of HNO_3,
and then heating in oven -

weight of result taken -

.2827

wire + NO_3 7.7865
weight of wire 7.6209
.1656 $Fe(NO_3)_3$
.58% Fe_2O_3 .7
.11599 Fe

Standardizing of Sol. for Fe.

5 grms weight of KMnO4

wgt of Iron wire 1.0013

Reading on Burette 48 cc

23.3 Volume of KMnO4 71.9 cc

95.4

50

73.3

5) 1.0013
.20026
.996

120 156
180234
180234
.199589 6

23.3) 19.9959 6 (.85604
18 64
1305
1165
1408
1398
1090

100 cc Permanganate = .85604 pure iron

analysis

2nd Sample wrot.

wgt of wrot taken .2010

54.1
45
6.1

.85604
6.1
-85604
513624
5.218 44

.05 32
5
.2660

2 oz Standard

1 gal Ammonia

28.[illegible] — 71.4

28.8
1.6
.4
23.3

.996
.20
.19920

23.3) .19920 (85.49
1864
1280
1165
1150
932
2180

= 1 cc

100 cc Ammonia solution = .85.5 lbs.

85.49
61
85491
51294
5214890
5
2607445

$$Fe + 2HNO_3 = Fe(NO_3)_2 + H_2$$

$$2\,Fe(NO_3)_2 + 3\,H_2O = Fe_2(OH)_6 + 2NO_2 + N_2O_5$$

$$Fe_2(OH)_6 + \Delta = Fe_2O_3 + 3H_2O$$

also

$$2\,Fe(NO_3)_2 + \Delta = Fe_2O_3 + 2\,NO_2 + N_2O_5$$

Rusting of Iron -

When confined in box - and exposed to a direct current of HNO_3 fumes - action of 25 - 45 min - sufficient then heated - the coating of rust is known irregular - if the wire after exposure to HNO_3 fumes be washed the coating is too thin - if the wire be heated as it is taken from the box the oxide is of varying thickness -

Exposed to moist air for varying lengths of time and then heated gave good results -

Exposed to steam - results not good

Placed in salt solution - then washed rust was of uncertain thickness -

Placed in salt - heated without washing the rust was fairly good. -

SO_2 SO_4

Removal black oxide on iron by immersing for a few minutes in a bath of conc. sulphuric acid and dilute H_2SO_4 – oxide is easily removed by rubbing.

Reduction by H – C + CO – not sufficient

Black oxide of NiCl – not H_2O assumes myself –

Heaven 10 × 6 × 7 – upon gaseous consisted by fumes of HNO_3 placed in 2 dishes over flame –

50 lbs. heated – on sticks ~~[illegible]~~ 14 hrs by steam alone – then dried of Cover 1 [illegible] placed in hard. steam continued 5 hrs – Placed in ovens – at 100°F – heated to 250°F and slowly – Placed in heated oil + Benzine – oil thrown off by centrifugal – Heated to 212°F –

Notebook, N-91-01-24

This notebook covers the period January 1891-April 1892. It was used by an unidentified experimenter, probably William K. L. Dickson, for notes, drawings, and calculations regarding iron ore separation experiments. Among the samples tested are ores from the Ogden mine, site of Edison's New Jersey and Pennsylvania Concentrating Works, and from the Spurr mine in Humboldt, Michigan. The pages are unnumbered. Approximately 20 pages have been used.

Weldon concentration
at Lampeka Jan. 24

Tailings — Weight grams
Coarse 5.0, 1 dozen 32.500
fines & slimes 7.500

% fines 18.5
% iron in which 8.08

Corn.
Coarse 5 to 1 down 41.5
fines & slimes —, 5.

10% fines

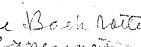
Jan.

Guide Board Matter
Experiments

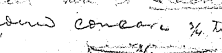
The convex superstitch is a great improvement on straight ~~pretty~~ sides.

but needs occasional attention

Bill found by Eng. chief to be man to stack sides so pound concave 3/4 to —



then changed to 1" - Concave is better all, an improvement on convex but still in order requiring a little attention of foreman, in most constant but attention on riffle box, if block guides were used near the roller as for stacked



Ori

[illegible] Cap,

[illegible] Belt Cuts always to slack side, consequently concave side be better [illegible]

Of gives [illegible] work for belt & finish —

Jan 28/9

2 Small bars received from McCeing

Specimen 40 mesh — then refined concent. 100 — mesh —

			analysis
#1	Stickpile Crude	40 —	59.36
"	" " "	100	64.73
#2	" " "	40 —	57.16
"	" " "	100 —	64.63

Quite hard to sep. fine grain. Slightly in favor of No 2

[illegible]

Feby. 29th 91

Hunter at Ore

magnetite

	1st Test	2nd Test
Con —	69.86	71.69
Tails —	23.89	10.20 lbs
Cap. —	1200	
Crude —		

Tails & Concentrates and reduced to 150 mesh when done 26.78

Concentrate Tails or magnetite pounds 150 mesh = 26.78 lbs

magnetite

40 mesh

Con — 68.78

Tails — 83.1 ~~2.89~~ magnetite pounds

Cap — 1360

Crude — 47.

pounds 150 mesh = 65.58

Tails retested 3.6

Feby. 3. Ogden Ore 40 Mesh

Conc 40 mesh, 70.58

Tails 3.29 + mostly magnetite

Cap 3,060 lbs hour.

Crude -

Conc reduced to 150 mesh disc machine 68.41

Feby. 6. Hunter at Ore 40 mesh

Concs 65.88 run through disc machine (recently done) shows 65.08 at 150 mesh

Cap 1020 lbs. Concs

tails at 150 mesh 23.16

Concs from tailings at 40 mesh reduced to 150 mesh shows 31.80 iron

this shows tailings nearly all magnetite.

(93)

Feby. 6.

Ogden Ore - 40 mesh

Cap 32.50 lbs Crude ore

Concs at 150 mesh 68.30

tails reduced to 150 mesh 0.724 in

Speed belt 520 ft.

Feby. 6.

Ogden Ore 40 mesh Concs

run through second time

show 69.50 iron at 150 mesh

Cap 930 lbs Conc

Speed belt 520 ft

Feby 13/91

Wharliegs attachment

		1 mat. 150 mesh
Ogden ore - Con. 5-mag.	Cap 2000	67.90
" " Tails " " " "		1.62

Speed of Bell 520 - Speed of Whirl. 240

		1 mesh
" " Con 10 magnets	Cap 2000	69.86
Tails " " " "		21.50

Compare Tails reduced to 150 mesh = 44.55

Speed 520 - ~~Whirligig~~ 240

Ogden Ore Con. 16-mag.	Cap 2000	68.48
" " Tails " " " "		1.80

~~Speed 260~~ -

OK.

March 8th 91

Mr Batchelor Brot Some
Con 100 mesh Very dirty analysis
95.5% ox. ide — 4.5% Dirt (impure)

Washed a Sample
filter the Sp. Water Dirt = 5 Diam
Dirt the Con. = 76.

76) 500 (6.5%
440
60

6.5% Dirt found by washing
4.5% " " " magnetic mag
— 2%

2% Gain by washing

Sent Feb 28/91
March 1/91

Perry Butler ore

Chem. Analysis — Iron = 49.50%
Sulphur — not enough to calculate
phosphorus — " " " "
Manganese — .33%
Titanium — — 10.310

Iron Con = 54.13
Sulphur — not enough to cal.
Phos. " " "
Mang. .24%
Titanium 6.5265

Tails
Iron — 24.90
non mag Hematite.

Aylsworth
Chem

Iron Con. from Apr. 15.
Bell machine after Nos

Sent out for analysis.

Known a marked as:-

marked				
#1 = Dx analysis for phos. P.O.P.	30 mesh	ang (all passing thro 30)	64.4 .046 phos	
#2 - Dx	40 "	" "	65.7 .046 phos	" 40
#3 - " x	50 "	" " "	65.9 .045	" 50
" 4 - x	60 "	" " "	66.12 .042	" 60
" 5 - x	70 "	" " "	66.15 .042 phos	

washed exp.
x 11 is same as 9
x Concentrate Washed

Took 30 grams - of the Con - 64.44 phos. after washing = .021 phos
9 opinion original
21 opinion after wash.
= % loss by washing

Extra 3 Samples but for Sulphur Determination -

3 Samples Dred. Canada - all carried Sulph. plainly to be seen before, breaking -
x 1 from a low grade piece that appears where they have worked the vein at rate 210.
x 2 Comes from same piece a few feet further from vein opening -
x 3 Dth. #3 #2 #1

Pa Slag. Stretton Pa.
ap. 28/9/

Hard metal balls — 12 grams

Magnetic part 40 mesh - 9.500
Dia - " " - 149.000

12
9.500
149) 21.500 (14.42 % met.
600
640
440

Average of a
Barrel Slag -

6173

Mr. Edison's Direction May 6/91

Batchelor Ore Exp.

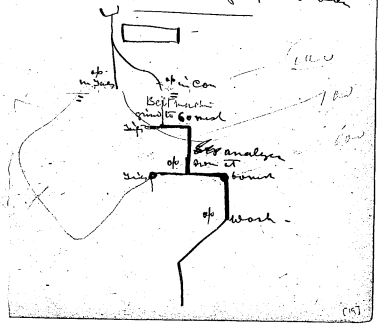
took 40 grain - ore 50 mesh
reduced =
Tails — 30 grain
Con — 10
or ~~[illegible]~~ Iron = 18.10

Now took 10 grains of the Con which was perfectly separated at 150 mesh the magnetic take up -
ground to 150 mesh = 65.16
washed this = 61.54

Mr. Edison Sec

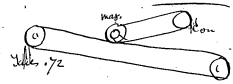
Rough Results of May 7/91
on Batchelor
30 Samples
Done by hand to minutate bar. separator
@ 20 mesh
Con — 35.4
Tails — 1.44

Satisfactory ~~[illegible]~~ on Batch ore 30 Samples
20 mesh strong point bar



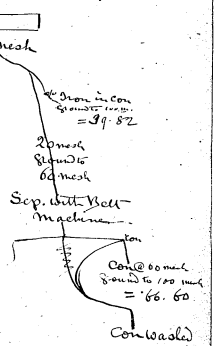
May 21/91

Test of Tailing Pick up
4th loss in Ogden Dump.



Used Dechtelsville Tails 2.89
Ran thro machine = .72 Tails

Batchelor Ore
Immiration of new plant.



Poor ore.
at 60 mesh sh^d = 70.

Sep. 11/91

Mallory Samples Experimented on as below a bottle sent to Messrs Clapper Hunt. phil. their results then mailed to Mallory

#1 A. 16	@	10 mesh	Con	17.55
" " "	"	" "	Tails	14.83
. . . . .		14	Con	16.77
. . . . .			Tails	15.18
. . .				
. . .		20	Con	14.95
			Tails	16.57
1 C. 46	@	10 mesh	Con	57.90
" " "	"	"	Tails	7.44
" " "	"	14 "	Con	57.37
. . . . .			Tails	7.73
. . . . .		20 "	C.	55.27
. . . . .			T.	9.44
4 A 23	. . .	10 mesh	C.	~~30.60~~
. . . . .			T.	9.83
. . . .		14	C.	29.22
. . . . .				10.22

4 A 23.	@ 20 hour =	C. 26.75
		J. 12.10
5 B. 59	— 10	C. 28.80
		J. 11.61
	14 hour =	C. 27.22
		J. 12.66
	20 hour =	C. 24.20
		J 15.
*1 D 80	10 hour =	C. 32.35
		J. 18.52
	14	C. 21.31
		J. 18.90
	20	C. 28.40
		J. 20.82
*1 B. 29	10 hour =	C. 30.[illegible]
		J. 24.[illegible]
	14	C. 29.[illegible]
		J. 21.[illegible]
	20	C. 26.[illegible]
		J. 23.6.

*4 A 45	— 10 hour =	C. 45.49
		J 5.50
	14	C. 44.16
		J. 5.87
	20.	C. 42.11
		J. 7.30
*1 A 23	— 20 hour =	C. 7.59
		J 7.60

0.1<..

Nov. 10/91.

Large Bag of ore from Mallory.
In special box on bar at Bell.

Magnetic assay made at 70 mesh.
~~Tails~~ Weight of Tails after Bar Sep. 27 lb. ½
" " Con " " " 75.

Bar :- Tails ——— 6.15
Con ——— 52.85

Crushed to 50 mesh & Sep. on Belt
Weight of Con after Sep. @ 50 mesh = 57.
" " Tails " " " " " " = 14.

Magnetic assay after 50 mesh stuff.
Con ——— ~~64.25~~ 66.96
Tails ——— .85

Chem. pitting analysis :- Sent to Mr W.S. Mallory

Rec'd Nov. 24/91

Exploited on Rec. 1st Mallory Ore - Michigan
* Trench -

Crude Ore - crushed to 100 mesh & assayed.
Net Iron - 24.34

Weight of Ore - before Sep. on Bar. . 5½ lbs.
" " Con after Sep. 36 lb. lbs
" " Tails " " 26½ "

Concent. of 10 mesh crushed & assayed at 100 mesh - = 36.14 %
Tails of 10 mesh crushed & assayed at 100 mesh - 9.87

Weight of 10 mesh con. after being crushed to 50. mesh 36 lbs.
Weight of Con. after Sep. on Bell-machine 19½
" " Tails " " " " 10½
Con. after Sepan. #1 net Iron. 11 lbs. 13 " 57.34 (100 mesh assay)
" " " 2 " " 13 " 55.41
" " " 3 " " 13 " 54.25
Tails after Sep. on Bell-Machine - 1.62

Notes from Ogden
sent by Edison Batchelor Dec. 11/9.

Sample one from Alex. Elliot property
Pa. Deposit - from the top of the
mountain 200 feet above the river
A schist - composed of separated
crystals of magnetite like those in
Talcose schist -
Test. 14.4 % mat. at 70 mesh - will
probably give 13. % @ 50 mesh - & not
more than 63 % concentrate -
At 100 mesh it gave 14.9 %
The Con. regound reduced it back
to 14.1 % - The schist is
that variety that looks like specular
iron ore - Very hard to crush on
account of close grain -

Batchelor

rec'd - 14 Dec 9.

Quartz Ore Feb 29th/92

Ore No 1 W. Sil. & phos. Considerable molybdenum most in ass

" " 2 W. " " " "

" " C 1 " " " "

" " C 2 " " " "

* of analysis 53 — 56
Feb. 23 — 26/92

(11)

Mar. 7/92

Morgan –

2 – heads Con. & B 200 & A 100 [illegible] 6.72

A [illegible]

B. Con taken & mag. roast separation Dry 100 mesh

assay B Mag. – 247 – 17.92

Dia. – 281 14.04

Con taken again. – roasted 100 mesh separ. wet Mag (Magnetic [illegible]) 100 mesh.

roasted C Mag. – 20.08

Dia – 8.76

Con taken again.

roasted 200 mesh – Wet

D Mag. – 13.76

Dia – 12.48

Ogden Mills

Apr. 2/92

Belt Machines –

#1 feed = $\frac{.54}{100}$ of a in.

2 " $\frac{.59}{100}$ " " "

3 " $\frac{.62}{100}$ " " "

5 machine old belt. –

#1 – slowest feed (for reg. run) – 70.59

2 – faster 70.72

3 – faster 69.58

" " " finishing = 5 – 69.50

" " " machine old belt

#3 – fastest feed for comparison 69.69

---

15 Machine New Belt.

#1 – 70.77

2 – Ditto above – 70.77

3 – 70.95

16 machine Spun Belt –

#51 – for comparison higher speed 70.99

av. of all machines at 51 is.

During these Experiments – slow feed = 70.59

Angle Exp't on #15 –

reg. slow feed angle not changed 70.77

" " " " changed – 70.77

Exactly duplicate 70.95

1000
690
9350

10
9850

1000
690
9350

9650
724
3860
1930
6755
69560

A — Jan — Money
B — Com — 174
B — Jan — 14
— Com — 20
Jan — 5

Notebook, N-91-11-24

This notebook covers the periods November 1891-September 1892, March-December 1894, June-December 1895, and May 1896-December 1897. There are also some entries from 1899 and 1902-03. It is the first of three extant books used by Albert and Charles Wurth for notes, drawings, tables, and calculations regarding phonograph experiments (see also N-97-12-15, Notebook Series; and "List of Moulds and Catalogue Numbers," National Phonograph Company Records, Company Records Series). Included are entries relating to the electroplating of phonograph cylinders to produce master recordings, along with lists of the sound recordings that were used. There are also notes and drawings of experimental recording apparatus. Some of the notes are in French. The front cover is labeled "Rooms 5 13, 14, 29, 30. Chas Wurth Nov 4th[?] 1891." Another label, partially torn, indicates that the book was used as an exhibit in *American Graphophone Co.* v. *National Phonograph Co.*, United States Circuit Court, District of New Jersey. The book contains 181 numbered pages and has been used in both directions.

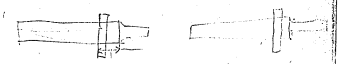
Filming order: 5-165, 177-172, 178-181.

Blank pages not filmed: 156-163, 166-171.

Missing page numbers: 1-4.

23. 1¼ x 5/8

Thermom. à boule −10 à +110 en degrés trop haut
petit à anneau 65 à 140 1/2° trop bas.
" sous anneau 90 à 135 1° trop haut
" au vacuum 1/2° bas
" à la maison 0,5° bas.



13/16

No. of Mould	Diam	~~Rough~~ Mould Length	S. Diam	Finished Cyl. Length	~~Turning~~ Turning off Mach L.	R	Remarks
A							
B							
C							
D							
E							
F	2.167	4.000	2.170	4.009	31½	.48.	at 85° Room Temp 4.010. 2.171.
G							Com. temp. for turning of cylinders.
H							Tool temp. 39° cut on 1st. flow 37½. 2nd. flow 48
J							" " 75-39°. " on 1st flow 34. 2nd. flow 48
K							" " 66-75°. " " " " 38. " " 49
L							Shaved. 75-39° " " 31½ " " 46
M							" " 26° " " 31½ " " 45
N							" " 15° " " " 31 " " 43

Mould	Diam	Length	Diam.	Length	Thr.	Remarks.
O						
P						
Q						
R						
S						
T						
U						
V						
W						
X						
Y						
Z						
St.						

1						
2	T					
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						

	D.	L	D	L	Sh.	Temp	
					1 Sec		
15	F 2.169	4.002	2.173	4.013	31. 46		Turned down Pt.
16							
17	F						
18							
19	F						
20	F						
21							
22							
23							
24							
25							
26							

	Mondal.		Cyl.				
27	F 2.169	4.002	2.172	4.010	31. 46		
28	F						
29							
30							
31							
32							
33							
34							
35							
36							
37	170	093			1½ Short	59°	Rec. OK but finish faulty N.3.
38							
39	169	096	F		OK	70	Rec OK very little scratch.
40							

	D	L	D	L	Str.	Temp	
	20						
41							
42	.170	.183					
43							
44	.169	.058					
45	.171	.200					Rec. OK not over 1" [illegible] (poor boring)
46	F .170	.101			1/2 bl.	57°	Recess good. [illegible] passing to hard.
47	.170	.031					not very distinct. Bad spotted
48							
49							
50							
51			F		1/2 bl.	60	Rec. not [illegible] enough
52	.171	.088	F		1/2 bl.	69	Rec. not quite deep enough, but clean. Dried hard
53					1/2 l	70	Rec. OK

			Cyl.		4 R		
		4.000	2.170		32.44 R		to 75° Room Temp.
54	.170	4.000	2.174	4.008	31.45		at 85° Room Temp
55	.169	.105	2.170				77°
56	.170	.169	F				Rec OK - not pressed endways, leave too large in Diam
57	.166	.024	F				rec. OK [illegible] not end.
58	.168	4.001	2.170	4.008			at 75°
59	.171	.077					
60	.168	.111					
61	.170	.091	F				Rec. OK
62	.170	.094					
63	.165	.064					
64	.171	.175	F				Rec. OK very little iron. Pressed hard leave long
65	.170	.152	F				" " " Scratch on the end. " " core cooled
66							
67							
68							
	20		D				

	D.	L.	D.	L	Sha		
69	14						
70					64	75	Rec OK Sev. Sing.
71							
72							
73							
74							
75							
76							
77	172.5	218			OK	70	Rec OK Music too loud. Sparkle and Bud.
78							
79							
80							
81							
82							
83							
84							
85							
86							
87							
88							
89							
90							
91							
92							
93							
94							
95	15						

Batt. No. IV Cylinder weighs 91,1 grammes
after 118 hours at 25° 382,1 "
Copper Deposit 291 "

Batt. No. 1 Cylinder weighs 82,9 "
after 118 hours at 25° (Cels) 386,9
304

1 Ampère hour deposits 1,82 grammes
360 grammes in 118 hours = 2,15 Ampères.

Thermometer #. 1 3 1/3° too low
17.4° C Standard = 63.32 F (Above 60°)
#. 2. 1/2° too low
3. 2,2° " "
5. 1,4° " "

Post 30-130 1/2° too high

November 24th 1891 Cores cooled to 50°

K Commenced pressing at 112° Core. 86° Tank finished at 110/98
This cyl. has been standing in the mould ever since heating for
3 days. heated 1 hour.
Sh. OK. Surface scratchy and not quite bright but not
perfect. Record good and clear but not hard.

H Core 108° T 90° – 110 · 99 · 55 min Sh. OK
Record good and very hard, a little scratchy.
heavy scratch at the end. Surf. not quite bright

G C.108 · T 92 – 110 · 100 · 55 m Sh. OK 63°
Record very hard. little scratch. Surface bright.
short heavy scratch at end

D. C.110 · T 94 – 110 · 100 – 50 m
Turned the water on through the core 10 min. after Sh. OK
Surface dull but not very scratchy. few dust cracks.
short scratch in commencement. Record OK

6½/2 A C.106 · T 95 – 110 · 100 · – 45 m Sh. OK
Scratchy. Surface a little dull Rec. good.

7½/1 R C.107 T. 97 – 111 · 102 42 m Sh. OK 63°
Surface dull. a little scratchy Record good.
a few length-wise.

6¾/1 S C 109 · T 96 – 111 – 104 · 40 m Sh. OK 66°
Rec. very clear. no scratch. Surface bright.

6¾/1 J C.110 · T 98 – 111 – 103 · 40 m Sh. OK 65° 19
Surface a little dull. Set at beginning and a little throughout
Record good.

V C 110. T 99 - 111-103. 40 mm Shr. OK 62°
T Very good Intersection. Recd very clean. Surface
Bell fine only. Origin 2 long
W C 110 T 99 - 112-105 40 mm Original 5 ok
T Very little scr. Plain only. Poor Cone Thr. mould.
a small crack in the middle length of cyl. Was stuck to
mould at ½ of length from 2d Shr. OK
X C. 110. T 100 - 112 - 104 - 40 mm
41 Shr. 1 long not Very smooth, a few cracks
2 Rec very clean. Was stuck to mould at end of announcement
Shr. 1 long. Finish a little pitty
E C 110. T 100 - 111 - 104. 35 mm
62 [illegible] 40 mm [illegible] 35 m.
1 Shr OK at 62° (K Ins) Very little scratch. Rec. OK
This cyl has been exposed to about 72° after
receiving its mould.
Dec. 1. 1891.
178 Record Cyl. 10 longer than mould. Record Original
and smooth: there was not found off smooth but
dull and scratchy. Temperature in boiler and trunk
either 105° and 108° placed 60 min. Shr. OK
Foolish song
2 43. Very good only at beginning. good sound half
Shr. 1 long.
1 53 OK very little scratch
20 Shr. OK. 70°

1 67. Blank turned down .01 mm smaller than mould.
Record smooth and plain but not very bright,
beginning a little scratchy. Shr. OK. at 74
Surface dull Temp. 110° 108° 50 mm
2 74. Scratchy. Rec good. 3/4 long. at 74°
2 38. Scratchy. Rec OK. Shr. OK 74°
2 66 OK. a little scr. at end. " 68°
1 70 OK
1 75 " very smooth
3 49 Very scratchy.
1 50. OK
2 76. Good. Shr. 1 long. at 70°
has been cooled off in the air at 26°
and has shrunk a little onesided.
1 73 Very good and smooth
2. 58. Rec very good. Scow half very scratchy
2 68 OK very smooth finish stiff, stiff.
2. 40 Record OK Poor song. Very smooth
2 77 Record OK very Smooth Shr. OK
Unbearable
Music too loud. Song too weak,
and not intelligible

1.955
4128

A	My treasure York	Xylophone
B	Patrol coms in(?), Comique	"
C	Dorothea Walter /	Cornet
D	Calm Branches /	"
E		
F	Only to see her face again	"
G	Cry Baby	Jacobin
H		
J	Laughing Song	Johnson
K		
L		
M		
N		
O		
P	Air & Variations	Clarinet
Q		
R		
S	Coming through the Rye	Clarinet
T	Emmett's Lullaby	"
U		
V		
W		
X		
Y		
Z		
Sp	H. M. Stanley	Talking

2.	Maggie Murphy's home	Flute
3.	Press Club March	5. R. Band.
4.	Maggie Murphy's home	Clarinet
5.	Sallie is our Alley.	"
6.		
+ 7.	Polka Brillante	"
8.	Long long ago	Flute
9.	Blue Jay - Polka	Piccolo
10.	Russian Air	Flute
11.		
12.		
13.		
14.		
15.	The Monarch of the Woods	5. R. Band.
16.	Scanlons Swing Song	Jaskin
17.	Ethiopian Clogg-Dance	5. R. Band
18.	Always together	Jaskin
19.	Beautiful Language	5. R. Band.
20.	Out on a Lark	"
21.	The Picture turned towards the Wall	Jaskin
22.	Light of foot - March	5. R. Band.
23.	Winona - March	"
24.	My Todds high Chair	Jaskin
25.	Little Dorrit Waltz	5. R. Band.

26.	Reilly and the 400.	5. R. Band.
27.	Mikado	Orchestra
28	Lebenslust	"
29.	Her own boy Jack	Jaskin
30.	Erminie x	Orchestra
31.	Tarriers' Drill	Jaskin
32.		
33.	Martha Washington Gavotte	Orchestra
34.	Skirt-Dance	Clarinet
35.	Patty Shay	Jaskin
36.	Vienna Dude March	5. R. Band.
37	[illegible]	[illegible]
38.	Soldiers Farewell	Mand. Quartetto
39.	Hard Times	"
40.	Glory Hallaluya	"
41.	Down yonder in the Cornfield	"
42.	High old Time	"
43.	Beautiful Star	"
44.	The Picture turned to the Wall	"
45.	Sally in Our Alley	"
46.	Loin du Bal	1. R. Band.
47.	San Jago Waltz	"
48.	Dress Parade March	"
49.	Idalia Waltz.	"
50	Coniads	Mand. Quartett

51.	On a Bridge	Mank. Quartett.
52.	5 minutes with a Minstrel	1. R. Band.
53.	Back to Dixie	Mank. Quartette
54.	Anvil Polka	1. R. Band.
55.	I whistle and wait for K.	Mank. Quartett.
56.	Sambo's Wedding March	1. R. Band.
57.	Hail Jerusalem	N. Quartett.
58.	Wien bleibt Wien	1. R. Band.
59.	One minute too late	"
60.	My sweetest	"
61.	Darkey's Dream	"
62.	Invincible March	"
63.	Miss McKenzie	Song.
64.	Lovely brown Eyes	1. R. Band.
65.	The Alarm	"
66.	Every Day's to be Sunday by & by	N. Quartett.
67.	Spanish Fandango	1. R. Band.
68.	Anchored	D. B. Stout.
69.	Murphy's Wedding March	"
70.	The wild man of Borneo	"
71.	They're after me	"
72.	He isn't in it	"
73.	The happy three	"
74.	Speak Easy	"
75.	The Song that breaks my heart	"

76.	Mc Mullins Superstitions	D. B. Stout.
77.	Maggie Murphy's home	"
78.	Anna Maria	"
79.	Stella Waltz	Gilmores Band.
80.	Normandy March	Princeton Boys &c.
81.	Twilight Marguerade	Gilmores Band.
82.	Conqueror March	" "
83.	I can't believe her faithless (Song.	Joe Natrus
84.	~~College Songs~~ Merry Monarch -	Gilmores Band.
85.	College Songs	" "
86.	Wm. Tell Ouverture	" "
87.	Fisher-Boy Song	Joe Natrus
88.		
89.		
90.		
91.		
92.		
93.		
94.		
95.		
96.		
97.		
98.		
99.		
100.		

Observations thermométriques en Vaenor
Janvier 12 - 1892 #1

67°	8.52	7.22	—	80°	8.59	0.5
78°	9.7	4.25	—	85.5°	9.14	.4
82	9.22	4		87.5	9.28	
84	9.55			88	9.40	4
85	9.47	3.70		89	9.51	3.8
84	10.[illegible]			90	10.9	4
85	10.20	3.8		90	10.25	3.9
85	10.35			90	10.41	4
84.5	10.54			90	10.59	4
85	11.10	3.7	Sept. 19	90.5	11.15	4
85	11.27	3.8	Oct.	90	11.32	4
~~85~~	~~11.47~~	~~3.7~~		~~90~~	~~11.~~	
74	1.29	6.0		86	1.40	5
83	1.49	4.5	28	89	1.55	4.7
85	2.3	4.5		89	2.8	4.8
84	2.18			90	2.25	4.7
85	2.34			90.5	2.40	4.9
85	2.51		Nuit - Entrée	90.5	2.58	5
86	3.12			90	3.11	
86	3.19			90.5	3.26	
"	3.33			92	3.40	3.55 - 90

~~Janvier 90~~		Janvier 13		92	#2
69.2	8.50.	7.	87	9.8	5
82	9.14	4.4	87	9.20	4.8
83	.21		87	.56	4.5
82	44		87	.51	4.3
82.5	10-	.4	87.3	10.18	4.3
82	.15		87.3	.21	4.3
82.	.30		87.3	.36	4.3
82.1	.45		87.3	.51	4.3
82.2	11-	.4	87.4	11.6	4.3
82.3	11.15		88.1	.21	4.3
82.5	.33	4.2	88.	.38	
82	.51	4.2	87	.56	4.2
74	1.45	6.3	87	2.05	3.6
82.	2.10	3.7	87	2.17	3.5
82	2.27	3.5	87	-32	3.6
82	-42		87	43	3.5
80	3.5	3.4	85	3.10	
80	3.20		85.5	2.27	3.5
80	3.38		85.	3.44	
80	53				

Retiré de la boîte et ~~[illegible]~~ de suite
Enfermé sous la cloche à 6 ½ soir à 12
Temps humide, brouillard et pluie fine
Après les premières 18 min un beau dépôt or pur
mêlé humide, brouillard après.
Ciel clair à midi, couvert après midi
à 2 h. 30. le dépôt sur la partie inférieure
en cylindre brun foncé, part. supérieure
bleue violet.
Épaisseur de la cathode en commençant #1
.002" épaisseur
3 h. 35 bas ¼" beau rouge brun, 1" violet
1½" brun rouge-bleu, 1" en haut beau bleu.
Le cœur de la boîte d'étain était verni!
Dist. entre Cath. et Anode 27.5. Am. et Cyl 44 (Cu Zn)

Janvier 19. 92 —

Réglage à obtenir!

	Exide	Eau	Bain	Cyl. # 2
8.4. PM	76	76	76	
6. "	80	76.5	76.5	Exide bleu foncé
19. 8 AM	76	77.5	75	couvert de cuivre
8.40 "	98			immédiatement!
2 PM		78.	70	Vers fait Chambre 70
4 6 "	75			
20. 8 AM	68	76.5	77.5-79	" " ≃2
6 PM		77	77.5-78.5	Du table 77.5
21 8 AM		77.5-77	78-78.5	
6 PM	77-73	78	78-77	Chambre 73.5
22 8 AM	73	77.7	76	Dehors 76

Bain de Bain chaude 79 froide 77.6
Fond " " 78 " 79
Exide du bain 1 homogène et cylindre
a été retiré 78.2

Janvier 23. 92.

Dimensions du meuble 4.677 2.175

A 4.682 . 2.180 ouvert 65 m. 77.5 97.
Donné un coup de pousse 75
avant de retirer le cone 81.5 96.5

Pas O.K.! Hasek!

D. 4.677 . 2.179

				Exide	Bain	Cone
B. 4.674	2.178	1.9 - 4.680)		98	97.5	
quarante-cinq min		1.8	Imp. constant	77	96	96
C 4.673	2.177 -	Chdr: 92.	Bain 88	Bath Room 80		

Pas O.K à 63° dans la Chambre 91.8 Cone. 90 45 p.r.v

Dist. des Anodes 46.- 27.5

Le cyl. a été chauffé sur le Registre ~~après~~ en attendant de la droite. Il pleut plus en moins toute la journée. Les parties du Vac. ont été bien nettoyé et resté propres

10.10	69.6	5	Commence à paraître
- 21	92.5	4.5	une ceinture jaune (or) à bleue
10 30	78	4-	(rayée) 3/16" à 1° de largeur
- 32	84	3.8	
10.45	89		
- 50	85	3.5	
10.59	80		Couleur du Cyl. Olive foncée
11.08	88.		Ceinture bleu, jaunâtre et
11. 17	82		
- 22	87		
11.32	80	3.3	
- 32	85		
11.47	79		Désaxé 8 Lampes de Résistance
- 53	85	3.4	
1 30	64	6.7	
- 42	79	4-	
1 55	79	3.7	" 2 en plus
2 2	82		
2 14	76		
- 20	83		
2 35	76	3.5	
- 37	92		
2 50	76		Réjouit 6 L.
- 53	84		
3 10	76		
- 14	82		Réjouit 2

3.05 . 17
. 30 . 86
3.15 . 77
31 . 84
49 – 35 . 5.6

Janvier 21. (Rayonné)

Le sujet inférieur bleu foncé, est maintenant rouge foncé en supérieur c'est oxide grès-bleuâtre.

Janvier 20. Dr H. Cornier Marcé

Le Temps est beau clair. Le cyl. a été exposé au soleil et à l'air sous verre

1h 56	79.	6.6.	Détaché 8 L.
2. 4	82		
2. 15	83	5.5	
–20	91		
2. 37.	82		Rayonné 2 L.
– 42	90	4.9	
2. 56	82		
3. 11	90	4.8	
3. 15	81.5		
22	90	4.4	
3. 35	81.5		
39	90		
3. 52	81		
59	90	4.3	
4. 11	81		
– 18	90		
4. 35 –	76		
– 43 –	86	4.5	Contour sombre de cuivre gris Ven. haut. rouge Ven. bas
53	78		

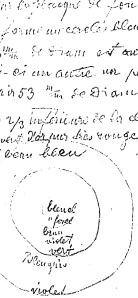
Janvier 21

9. 2	66	5.8
– 10	79	5.1
9. 18	74	
22	82	4.8
9. 32	75	
37	86	4.7
9. 53	77	
57	87	4.8
10. 18 .	77	
– 23 .	85	

L'angle supérieur commence à paraître en bleu bleu 1re Strange

10.06	77		
- 42	84,5	46	
11.2.	76		
- 10	88	45	
11 30	77		
- 32	88		
1 29.	72	62	Toute la surface commence à devenir bleu-violet ; le bleu commencé au milieu
- 51	85	47	
2.7	78		
15	56		
2.30	79	43	Le canal bleu s'étend à 3 m/m et change à jaune-orée l'angle
- 38	86		
2.55	79		Les bottages de fondation se forment un cercle bleu foncé
3.7	78		
3.15	77		
- 28	86		
3.55	79		bord 30 m/m de diam. et autour de celui-ci un autre un peu plus clair 53 m/m de diam.
- 49	87		
4.7	79		Les 2/3 inférieures de la cloche sont couvertes d'un jaune très rouge, et 1/3 haut est bleu bleu
- 23	87		
4 27	79		
- 39	86		
4 40	82	42	
50	87		

Le bel est bien formé vitré de bleu et gris



Janvier 25. 92. Pt. à Chaud # 4 (82)

		Bois	Chemb.	Eau.	Diam.	
					h	
2.30	P.M	75	71,5	78	77,5 - 78	
6	"	76	75	78.8	78.8 78.5	Bien convert après 5 m/m d'amp.
26. 8	AM	68	60	75.3	78.1 77.1	
27 8	"		61.5	72	76 - 74.1	Cloche 12 - 10
6	PM	73	70.	77	79 - 78.5	
28 8	AM	67	[illegible]	[illegible]	[illegible] - 76.7	
1,30	P M			[illegible]	[illegible]	
6	"	73	70	76.5	78.2 78.9 - 77	
8.5	AM	75.5	68	77.5	79.5 - 79.8 - 77.3	25

L'eau [illegible] Alexandrie a été chauffée à 130° le 25 le soir, Refroidi avec de l'eau froide à 110° à 6 h. et secondi à 104° à 8 AM le 27.

D. 2.174. L. 4.102. Chlore 92. Bain 88. Brome 80
2.176 4.150 91.8. Cre 90
50 m/m.

Thr. 1/4 to long ! Record very faint but distinct.

5%
an original eff. has been used for this Dupl.
Cette eire ne paraît pas d'avoir entraîné de dilatation et contraction que celle de 10%

Janvier 26 · 92. N° 5.

Deux bouchons d'or dans le Vacuum.

Durée 2 · m. 12 m. de longueur. Température

Distance des chocs des 2 mm mm

11.23. 69. 8.
11.40 87 55
— 17 85
50 88. 55
1.30 78 8
1.41 87.5 67
1.50 90
57 88 67
2.12 90
17 88 67
2.25 92
36 90 67
2.45 85
52 90 63
3 — 85
4 90
3.16 92
17 90
3.34 85
3.40 90
3.50 85
54 90
4 6 85
12 90 67
4.15 84
4.30 90

Fait bien bien ouvert
Dessous

Fait 12 coups

14.
18

Trace sur les bords
sur le cylindre

Cuivre 2° Large. (1/2" dessous
et 1/2" dessus) bien ouvert
le reste imperceptiblement
le 1/2 haut mieux que le 1/2 du bas

Janvier 27. 92. N° 6

Le cylindre dans du mois de Janvier passé est mis pour 8 ans dans une boîte.

1. 30	65.	8
44	85	7.7
2 –	78.	6.7
– 10	88	6.0
2. 29	74.5	
38.	89	
3. 1.	80	
9	95	
3. 24	79	6.5
38	95	
3. 46	52	
51	88	
4. 13	80	
18	88	

Petite de Lamm

Un cercle de 2½ de large où chaque bande trop peu d'or (pour) sur la chaîne

Février 1. 92. N° 7 (Cigarette sur le bimétal)

Le cylindre est de la même matière qu'précédents mais oblongé et terminé seulement depuis trois jours enfermé dans une boîte 14 jours 1 onz. est 14 jours avec bande de caoutchouc

Tous les points des tables avec la photographie pour ne montre au bout des premiers 10 m IV.

1.30-40	67-88	3.5
1.50. 55.	83. 89.	2.2
2.10. 15.	83-89	2.3
2. 22-25	83.90	2.3.1
2.37-43	83-89	
2.55-58	83-90.	1.3.

Une Trace d'or pour se voit

Une bête couche uniforme.

Maintenant l'argent agrandit l'intervalle, la vaisselle d'or est très personnel bleu clair, mais le bleu foncé fonce la cloche

La garniture de la cloche est bleue, mais vive, tandis que

3.1. Le cyl. est enlevé à 2.26. les deux bouts extrêmes tout entiers d'une très belle teinte bleu clair, le reste est gonflé d'or jaune, le reste est oxidé d'or, cuivre clair.

Temps actuel de vapeur 31 mm

Le cyl. est ôté de la boîte 8 Collège Sangs (Jamore) et mis dans une boîte sèche 1½ d'heure avant de le mettre dans le vacuum. Ce commence à 9h. Ce vacuum

3.45-51	74.5-86	9-5	est très vite. pas de trace
4.13-16	80. 85.	3.3-5	On voit bien violette. Moins que
4.28-33	82-89	3	Paraît plus violette ce vacuum devient
4.48-51	85-88	2.2	bleu clair au lieu de violet.

Trace d'or jaune aux angles extrêmes.

over

Tableau 2.

3.16-25	66-65	4-2.8	
9.5	80	2.1	
10	86		
9.27	79	1.8	
32	85		
9.49	79	1.5	
54	86		
10.11	79		
15	85	1.0	
10.34	79		
38	85	1.1	
10.52	79	1.5	
11.0	88		
11.20	79		
25	85		
11.41	80		
45	85	1.	
11.53	82		
56	86	1.	
1.10.	69.	5	
19	85	2.5	
2.1-5.	80-85	2.	
2.19.23	80-85	1.7	
2.35-41	80-86	1.5	
2.56-32	80-88	1.5	
3.19-26	80-88	1.6	

Du commencement le cyl. est rouge cuivre foncé, au bout de 9 min il est beau jaune or rougé. L'angle opposé sup. est orange foncé (rouge violacé) qui disparaît exposé aux rayons des accidens 5 min. dans.
Il devient jaune rouge cuivre.

On plein jour la vapeur paraît violet, dans l'obscurité beaux blanches.

La garniture sur la cloche est bleu, avec un petit trace de vert de mer.

Lucers est gris dans couche Dorpat couleur bronze.

Il devité une pourpre.

La couleur rouge se change en jaune et est complète par un jaune foncé.

Le jaune s'obscurcit en jaune pâle.

Remis exposition les 2. pompes.

La vapeur est rouge rose. Dès cuivre en plein jour. Le cyl. est couleur naturel. Les extrémités un peu vieil orange.

La couleur est sur la cloche est si épaisse, qu'on ne voit pas l'incandescence des cuivres, bien touché pour les angles ainsi du cyl. sont vieil brun-rouge.

Les vapeurs deviennent beaucoup claires.

Le cyl. rouge cuivre. Les angles bien foncé.

L'angle sup. est bleu.

Dès sera rouge devient peu vert

A 3.20 toute la surface commence à devenir verdâtre et à 3.25 est au beau vert-olive clair, foncé aux beaux contours, plus touché et plus large en-bas et la bord extrême (1/16") redevenant jaune or. L'ancre est couleur bronze, un peu vert sur les angles.

Je ne sondais que les côtés et l'introduction d'air à midi et à soir produisent ces effets. Il doit falloir

3.37.	82.	1.4	
-40	83	1.7	
3 56.	80		
59	84	1.2	
4.9.	80.	1.3	
-13	85	1.6	

* La couleur verte est plus uniforme sur toute la surface

La bande est jaune au bas à 3/16" à 3/16"

Vert au milieu plus foncé !

La cloche est bleu sous bas et le vert le milieu. et vert au milieu.

Temps actuel d'exposition à la vapeur 99 min.

Pavées closes à 3/8 De 7/8

Mis dans le bain froid à 9 Téor. à 11 c. 11.

Temp. du bain haut 44 Bar. 43.

Pris hors le

Atmp.-mot. 27°-28

Le Cyl. s'est ouvert complètement au bouche-rivet. En le plongeant dans le bain l'aiguille de l'atmp.-mot. n'a pas bougé et à monté très lentement à 25 (Courant de l'Accum. #3)

Février 3. No 8 Evening

Le cyl est resté de la boîte de prix et mes bras une boîte seulement est fermé a aeroplane dans en neuf. Les commencés du cyl en est [illegible] est rouge [illegible] après le [illegible] mais elle est pale et a [illegible] en [illegible] jour (vide)

9.1-13	68-85	2,2-3,3	Notre garniture d'observation
-23-[illegible]	80-85	2,6-3	à 10.10 la garn. d'or rouge [illegible]
9.45-49	80-85	2,6	jaune à l'angle extr. sup.
9.57-10.	80-85	2,4	notre cyl est [illegible] violet
10.12-[illegible]	80-85	2,3	La garniture de la cloche est bleu bleue avec une
10.30-34	80-85	2,2	petite tache de vert
10.55-[illegible]	80-85	2,2	
11.11-14	80-85	[illegible]	Le cyl est toujours plus [illegible]
11.37-41	79,5-86	1,9-2,1	[illegible] est [illegible] rouge.
11.55-58	80,5-85	1,2	Jaune violette [illegible]
1.07-13	80,5-90	1,5	La garniture est plus vert
1.52-58	77-85	2,4	Jaune [illegible]
2.9-13	80,5-[illegible]	2,5	Jaune opaque rouge rose
2.21-28	80-85		La [illegible] jaune un peu
2.35-44	80-85	2,6	Le angle [illegible] [illegible]
2.54-3	80-85	2,6	est brun-rouge en haut
3.13-17	80,85	2,5	garniture du cyl est un peu jaune-rouge
3.30-34	80-85	3,2	L'angle sup. du cyl est [illegible]
3.48-52	80-85	3,5	de l'angle. sont blancs

L'angle bleu est bordé de brun foncé est [illegible] gris. Le Cyl est très foncé rouge cuivre

à 3.4. angle moitié la [illegible] jaune. Le 4 bl. l'angle inférieur devient jaune, la [illegible] est la moitié inf. devient vert, supérieure reste rouge foncé

Diminué la résistance de 6 cl.

4.5.-85	80-85	3,9	
4.26-28	79-85	3,6-3,8	Le cyl [illegible] est vert foncé,

Temps actuel Temp. 8,7 mv. or pas sur les deux extrémités

Le quatrième à midi, le vacuum a été maintenu mais en recommençant à 11. un peu d'air est entré.

Février 4. No 9. Merry Morning

Mes yeux la cloche immédiatement — en sortirent de la boîte. Pas de boîte vide. La grange à moins ne va pas bien. Il a passé bien une fenêtre avant que le vacuum atteint a 3,5

9.48-57	80,5-85	4/2,0	Trace [illegible]
10.21-27	79-86	/1,2	[illegible]
10.40.	/81-	/1,5	[illegible]
10.45-49	79,85	/1,4	Cette couche [illegible]
11.3-7	80-87	1/1,3	Remis les No 2. et [illegible] 8 [illegible]
11.26-31	80-89	/1,8/ /1,2	Stop de courir and — remis
11.49-53	82-87	/1,3	4 [illegible] Varient pale violette
1.15-17	78,5-86	3/2,6	garniture du cyl orange [illegible]
1-38-42	80,5-87	1,8/1,8	[illegible]
1.49.58	81-87	1,6/1,5	[illegible]
2.14-17,2	80-85,5	/1,6	[illegible]
2-32-37	80-85	/1,4	[illegible]
2.51-54	80-85	/1,5	[illegible]
3.11.15	80-86	/1,5	[illegible]
3.34.38,5	80-87	1,5	[illegible]
3.55-4	80-87,5	/1,6	[illegible]
4.15-20	81-87		[illegible]

Temps actuel 7,9 mv

Le cyl est [illegible] or jaune clair sur les deux extrémités

Le cyl commence à tourner vert

La boîte de la cloche est [illegible] neuf

le verre un beau bleu foncé [illegible] vert

Février 5. # 10 Un Tell.

Temps aussi possible toutes les opérations les mêmes que le #9. Ce soir que les couleurs sont incertaines régulièrement 80-85

9.9-21	68,5-85	2/4	26
9.30-38	80-85	16	18
9-50, 54,5	80-85	17	18
10.7-11,5	80-85	12	15
10.17-21	80-85	13	14
10-33-52	80-85	12	12
10.9-11.13	80-85	12	12
11.35-40	80-85	8/11	
11.53-56,5	80,5-85	12	
7.22-27	79-85	12/31	
7.45-51	81-85	29	
2.5-24	80-85	29	
2.26-30	79-85	29	
2.46-50	80-85	30	
3.14-18	80-85	31	
3.26-30	80-85	28/32	
3.48-51	80-85	30	
4.8-10	80-86	31	
11.29-34	80-85	29/32	
11.49-54,5	80-85,5	12/34,5	
Temps actuel	91,5	11	11

Belle gam. d'ds sombre rouge
Face d'un natural sur l'angle sup.
La raison est plus est à peu visible
Les deux cercles sont à la même d'ds la lign.
Et ensuite que les deux d'ds plus bas, les couleurs sont les mêmes
Le temps est passablement beau
Changeant entre clair soleil abondant
Bon et le clair un peu vert bleu mentre bon à donner
Quand se commencent à 1 de Cy. est un beau jaune et foncé un peu vert sur l'angle sup.

Février 9. # 11. Arch. à vice normale (Jours beaux hor)

Cyl. de cire fait monté sur une ordinaire à fixat. Cire très claire. Le cyl. a été chauffé de 6 Fév. enfermé dans une boîte sortie au soleil le 8 et laissé à cambrelure. Le temps est sombre et humide. Vent S.W. Remon basse plus clairs ensuite

9.48-57	67-85	2/4,5	
10.8-13	75-85	17	
-23-27	80-85	15	
-40-45	78-86	13	
-55-59	80-85	14	
11.15-19	85-86	12/14	
11.38-42	80-86	14	
11.55,585	81-86	16	
1.30-38	72-85	20/16	
50-56	80-85	20	
2.12-16	80-85	20	
2.30,36	80-85	10/11	
2.51-54	80-85	18	
3.8-12	80-85	10	
3.30-35	80-86	10/10	
Fin à 4			

Soir convert d'une belle couche d'un rouge à la première gamme, mais le cire a bruncl. Les couleurs
= Les couleurs soir à est moins rouge
Quand le commence passe du sens de cyl. paraît une jaune que quand il est entièrement
Il commence à finir pas de cuire. Du rouge visible, à commencé rouge violacé, puis
Beau jaune et clair avec une petite trace de vert sur l'angle sup.
commence à finir vert sur com. finir, beau jaune et un com. ouvert

Bains froids

								Réveil
I	Fév. 9	10.3 AM	α	3/5	Ω	7/5	Fév. 13	PM
II	" "	5 PM	"	1/4	"	[illegible]	" 14	AM
III	" 11	5.30 "		3/5	"	1/16		

Cyl. # 12. (Suite) Délors

			Chb.	Boîte	Eau	Bain h.	Bas.
18.	6.	8.	76	73.2	74.2	76	" 74.5
19	8	M	76.5	74.5	75.5	77.3	76
20.	8	"	72.	74	73.5	77.6	76.3

Bain Temperé

Février 10. p2 Cyl. # 71. Chambre à 67° le 6 Fév.

α 3/8. Ω 1/4 Glycères 27 à 28

			Chambre	Boîte	Eau	Bain		Bas
"	11. 40	AM.	72.5	73	75	4.75	6.75.5	
	5.45	PM	71.	74	74.5	76	75.5	
"	8	AM	78	25	77	79.	77.3	
	6	PM	70	74	76	78	76.8	
12.	10	AM	65	72	75.5	78	76.	
	5.15	PM	75	77	75.5	78	76.3	
13	8	AM	65	70.5	74.5	77	75.5	
"	8	AM	67	66	74.5	77.3	75.5	
"	8	AM	65	67	73	75.6	[illegible]	

La différence de 3½° m'a pas fait du mal, le monde est sec, on pense devant.

Fév.

L'index de l'hydromètre a bougé 2° en montant
Cyl. dans le bain, a monté à 27 en bout de
2 minutes et s'est fixé à 28 en bout.

Fév. 15. Cyl. # 12. Cyl. 0. et argent — Amy. 23 à 24
L'index de l'hydr. est monté. Tiente. Sé. Juste à 10° mais
ensuite à 24.

			Chb.	Boîte	Eau	Bain h.	Bas.
15.	9.45	AM.	76.	73	75	77	6.70
16	8	AM	74	74	75	77	75.3
16	6	PM	71	72	74.6	74.8	73.8
17	8	AM (5°)	67	73	73.5	74.8	73.8
"	1.30	PM	78	74.5	73.5	75.5	74.5
"	6	"	74	74.5	73.5	75.5	74
18	8	AM (24°)	68	72	74	75.8	74.5
"	3.20	PM	70	74.2	74	76	74.8

Fév. 11. 92. # 12. Fèlix-Boy. Regular screw

essai avec 1 dans 100 et une dorée.

Liquide A un peu plus gras et plus coloré

8 lampes mentionnées ont été examinées par entant

de lampes de 16 o.p. et tous ces biches examinés

9-26-32	70-85	26/32		Gorm. Pure violette (ciel)
9-48-51	50-55	13/10		Bellement couvert vert olive clair (jaune)
10-7-13	80-90	10		L'or est entam bien jaune-or-bronzé
10-30-34	52-57	14/15		Le garnissage de la cloche est rose violet
				bien mat un peu bleuâtre à l'air et en passe
10-47-51	77-78	14		Temperance une 6 mention pp 1.16 e.
11-9-13	81-87	9		Gorm. de la cloche toujours violette
11-25	85-88	10		Toutes les 6 mention sont maintenant pp le e.
11-38-41	81	13		L'cyl contient de l'alliage bleu mais
1.17-23	75-86	14/18		pas vert.
1.32-41	80-87	16		Cloche violette sur les côtés un peu
2-42	82-86	20		bleu au milieu — bien bleu foncé
				à la fin de l'opération

Temps actuel 50 sec

Février 12. 92. # 13 mesures après part

Cyl. de cire ordinaire de 1250. Bouchons

[illegible] à accumulateur. [illegible]

Deux lampes 16 c.p. 81 mis. Pôle est 3" de largeur, 1/4 de

la plaque de fond. et la base de la lampe est bien nettoyée

avec de l'acide. Le vin est blanc rouge foncé.

7.50-58	70-85	38/37		Couleur d'or jaune très-pâle
10.12-16	80-82	15/10		Bellement d'or rouge
10.35-40	80-82	14		Cerneau de la cloche bien bleue
				au centre. Pôle base de vert
11.54-59	80-82	9/12		L'or sur le cyl est solid rouge
11-18-23	80-87	10		et jaune sur lampe bien.
11-45-49	79-86	10		
11-54-57	80,5-88	11		
1.18-23	78-85	13/16		Couleur rouge de l'opaque un peu plus
1.40-45	79-85	8/9		le rouge extrême commence à devenir vert
				toutes les opaques de nature 6. sur la
				[illegible] de Fonnier vert.

Fév 12 # 14

Mes nouveau cyl de cire blanc foncé (en 2 cas)

moulé sur cire ordinaire à Lect

2.55-3.	75-86	30/31		Trace d'or excessivement faible
3.19-22,5	81-88	15/19		Couleur d'or rouge assez bien marquée
3-43-47	80,5-87	13		
4.13-7	81-88	16		
26-29	81-86	15		
42-46	80-87	16		Couleur rouge commence à disparaître
55-59	82-88	15		or métallique un peu foncé

Gorm. de la cloche bien bleu pur

Tr. 13. 22 ff 15. Cyf. de eux ord. de 10% 4 ans

9-12-52-63-95-33 | [illegible]

[illegible] | Bien convertis

[illegible] 2015-57 25 | bien convertis.

13-59/77-86 14/24 Dette gain. d'or très peu rouge

11-15-21 / 785-86 / 11/16

11-39-41-78-59 12/14 Condamné qu'or naturel.

12-5 77-86 12/15

12-21-27 / 82-55 14/15 Eau à la bouche mais peu [illegible]

Ce malheureux serait bien fort, qui n'a jamais été tenté, Vive la nature !

506 Experiments about plating glass in the vacuum with the following metals

Gold — Deposit frosty metallic deposit visible in 5 minutes. translucent blue

Platin — Very difficult after 9 hours and 1160 Volts a brown dark deposit bordered by beautiful rainbow-colors translucent brown. Inside of glass covered with dirty gray metallic platinum. anode was far in the glass-plate 3/4"

Iron — [illegible] with the yellowish brown — like a glass-plate. 10 hours 1000 Volts 300 at

Copper — after a failure. Started with 500 Volts and raised gradually to 1160 Volts at the end of 15 hours. Shade half way between cathode and glass-plate (1 1/4") Translucent yellow. Refl. light rainbow! Scratching spots it altogether. No trace of copper on the globe

1102 Cadmium — Very good results - Heavy even coating with a shade glass half way between black-violet and dark chocolate brown. Deposit translucent gray or brown.

Iron March 31 - Exp. 2.

Used 8 wires of .016 for anode 1000 to 1150 Volts Distance between glass and anode and cathode 1" x 1 3/4" - time 2 1/2 days, very short intervals.

Thin microscop-glass 7 x 8 mil. covered with a fine brown translucent coat; not much of a mirror. Very little metallic iron visible on the edges of the glass-plate and on the globe & pictures.

Bismuth April 8. 2 strips 1/2" wide, .016 thick. suspended on nickel-wire 500 Volts. 1000 Volts 1 1/2" distance from the glass-plate

Slot plate covered in 8 hours. dark gray. a little chocolat near the side-edges, greenish in the [illegible] reflects light on the glass-side dark blue on the metal-side gray - a little brownish (metallic bismuth). beautiful mirror on the metal-side; dark-faint mirror on the glass-side. on glass-side on the side-edges 1/4" of pure metallic bismuth with - yellows - reflect and translucent light tan

2.d plate 1 hour 500 volts vacuum 23 mm. connected the 2 anode-plates 1". good metallic deposit opposite the anodes. some metallic reflection on both sides of glass plate (dark bismuth-centre) translucent dark green blue gray. Centre and sides of glass-plate very little deposit. oblique reflection gray. translucent pale tan.

Tin 10 hours 300 to 1200 Volts. Vacuum

Transmitted light. Transparent. Finished mirror on left side. Obliquely reflected light metallic [illegible] yellow [illegible] Thinner.

Cathode 6 Wires fine wire 5 [illegible] insulated [illegible] cathode, platinum. faint trace of [illegible] metallic [illegible] the plate holder. Dull [illegible] [illegible]

Lead April 11. 2 hours. 600 to 1200 V.

Transmitting. Dull [illegible] [illegible] Transparent [illegible] Dirty bluish grey, very [illegible] [illegible] being exposed to the air.

a [illegible] 2½" wide 0.005 has been used. Suspended [illegible] Platinum Pin.

Brass April 12–13. 300 to 1200 Volts.

Light Bluey and hard, Pole [illegible] brass of 0.0035 4" wide 6" long. Suspended on nickel [illegible] Pin.

Transmitted light is mixture-green, changes [illegible] green and olive-brown or bottle-green. At its end of 5 hours a metallic brass-mirror begins to appear but disappears again when a stronger current is applied (1100 Volts.) At the end of 9 hours the transmitted light is dark chromegreen. The oblique reflected light on the metal side is light bluish grey (zinc.) in the centre turning into purple and yellow at the sides; on the glass side the obl. refl. light is a little darker bluish grey with a tinge of purple. Dark purple close to the edge. The supposed plate shows a light deposit of metallic brass. The globe is transmitted dark olive green; reflect. purple, grey & yellow.

Antimony April 15–16. 12 hours 600 to 900 V.

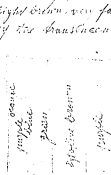
The Sb ground to powder, connected with nickel & platinum-wire. glass-plate 1/16 above. Transluc very faintly yellow: obl. refl. yellow, purple & crimson & blue

Iron April 19.20.21 1000-1100 V.

[illegible] from 4 × 5 ½" cast iron, distance 1½"-2". [illegible] the lice with the wire-gauze.

Nickel April 24 - May 600-1100 V.

[illegible] common short-nickel [illegible] 2½ cm, 5 strips ½" wide, suspended on nickel-wires. [illegible] short nickel ½" wide, 5 cm long. [illegible] the 2d day [illegible] nickel by [illegible] light but very [illegible], hardly perceptible; brandy-colored light [illegible] paint. At the end of the seventh day the transparency is extremely olive-brown. The [illegible] light is [illegible] in [illegible]. The extreme edges are metallic white. The 9th 5 days the [illegible] 1000 volts by stopping to 600-800 V. The deposit seems to darken. By raising again to 1000 it seems to deepen [illegible].



At the beginning the [illegible] nickel covered themselves with green-blue and purple oxide which grew narrower every day and disappeared on the centre-one the 20-spot and on the last one the 28 day. On the evening of 5 May

the vacuum was lost accidentally. In consequence the deposit became more purple the nickel-bag. On the afternoon of the 5th [illegible] the [illegible] the [illegible] been [illegible] the deposit became much darker brown (brandy) and more green (left). At 4.45 p.m. to 6th the pump is connected again for the 1. which showed that a considerable amount of gas had collected in the recipient, before connecting the vacuum stood at 1 m/m, after connecting it rose to over 8 m/m.

The 7th in the morning the pump is disconnected. Vacuum below 1 m/m 800 Volts. Bluish and rose-colored clouds along the walls of the recipient especially on the top. A faint trace of metallic nickel is spreading all over the glass-plate, more pronounced on the left than on the right. (The anode is always a little nearer to the left side) after 1 hour the clouds have all concentrated themselves in a small rose-colored pea at the point of the + pole (from the glass tube), on the back-side. This pea does not flicker and can not be moved with the magnet.

At 10.30 the recipient is [illegible] (disconnected) blue, the transparent back brown. At 11.45 the recipient is exhausted again, before connecting the gauge shows 15 m/m - after connecting 9; 8; 4; 3; 25; 15 (Volts) The appearance of the deposit does not change perceptibly.

~~Finished~~ Finished May 7th 12.15 P.M. —

Refl. day tint-white brownish. Dk coffee-brown

Gold May 9. 10.45 A.M. 900 V. (1)

Anode 1 strip ½" wide .0015 thick rolled on nickel-anode. Cathode nickel-plate ½" wide same thickness. Vacuum-jump pictures with HCl, Ammonia and aqua dist.

Started with 2 mm vacuum, stopped once at after 10 min. vacuum rose to 5 mm, stopped again after 20 m. vacuum down to 1½ mm.

Solution a light green throughout, with a few particles visible, which seem to be in the form of a sludge. Finished at 5 P.M. Anode pure machine gold, with little pure gold on the side, crimson in the crucible. Remainder of green solution with the crimson crucible ready to be carried to the [illegible] with concentrated HCl.

Mercredi 17. 1891. Recommencé à [illegible]
[illegible] entièrement.

[illegible] V. commencé à 21.55 Vac. [illegible]
[illegible] 22.50 [illegible]
[illegible] 22. Recommencé à 50° [illegible]
[illegible] 50° [illegible]
[illegible] 50° [illegible]
[illegible] 50° [illegible]

Mercredi 17. Réal. 50. 55. 60. 70. 72.

84 I	15	15	10	
85	10.40	10	10	
85 I	10	10.5	10	
	10.5	10.5	10	
86 I	10.15	10.5	10	
	10.25	10.5	10	
87 I	10.5	10.75	10	
	9.9	10.25	10	
88 I	10.20	10.5	10	
	9.10			

Mercredi 17. Réal. 72

		Coul.		
84 II	9'	110	95	Mov.
	9.40	111		Coing.
85 II	9.15	106	100	
	10.15	105	98	1/4
86 II	9.35	109	100	
	10.20	108		
84 III	1.24	119	98	Rapidité sans les bouche 11 sur OR
	1.24	106		
85 III		107		Sonne un coup de pesée
86 III	2.10	110		Sonné un coup de pesée
	3	108		OR [illegible] (81 C)
84, IV	5 – 5.10	116	95	Very good. Vendition [illegible]
85 IV	5.15 5	113		[illegible] good. [illegible]
86 IV		112		[illegible] OR good. [illegible] a few cracks in the centre.

Nous les avons ont été reçu un bon coup de press.
Sans dans la chaudière 150, conté un quart d'heure
86 a resté dans la glacière pendant la nuit.

May 18, 02.

84 V. Laissé le moût en l'air. Inhibé l'eau du robinet #6 Chaudière 141. Eau a servi pendant 15 min (à 107) Temp. de la chambre 80°. Passé. Refroidi dans 11. Pesité. Le moût 40 min après commencé eau froide. 35 le moût reste extrêmement trouble.

Sh. 14 mes. Sorbitol ~~[illegible]~~ & Q. Rein not so very clear

85 V. Mis le moût dans une bouteille sur le bain, le même robinet 6. Eau 7 min à 110. Levé la bouteille 2 min et laissé, coulé à 105 et remis à 110. Fermé et remis pour maintenir en 1 et coulé 102 et 107. 15 min. passé et mis dans 11 - 1/2 hr sorbitol. Sh. 3/4 mes.

86 V Laissé le moût en l'air. Rob. 6. Chaud.re 135 Eau à 110 eau. 15 min. passé et mis en 1 et laissé 1 1/4 hr

Sh. 3/4 mes. Rend not very cond. Reduced & Q.

Il me semble que il est n'a pas le temps de la recommencer et cependant les ~~[illegible]~~ vit et le moût est pas changé en même temps.

87 Mis le moût dans une bouteille sur le bain Rob. #6. Glycoconcentratum. Chd.re 133 (Chambre 82) 3.22 à 3.45. à 98° Remédié Eau froide, par cont. etc. et sortir moût de bouteille

Arrêté à 4.2. à 105. passé et mis dans 11.

Rendu toute la liqueur; gratte Sh.?

88 V Reduit en Temp. de la Chd.re à 110 et le bain à 102. Inhibé le moût dans le bain comme d'habitude et laissé couler l'eau pendant 40 m

Commencé à 5.5 avec 141 et 115

Fini à 5.40 " 112 - 106 avec 110

passé et mis dans 1 pendant la nuit.

— Parfait Sh. OK. (70°)

Duplicating Toy-Phonograph-cylinders.

Sept. 20. 1892.

Sept. 24. 9 A.M. 2.5 Amp. 48° Posit. convex
trop vite. contact beaucoup trop fort.
garniture éponge. [illegible] 1152
Sept. 28 5 P.M. [illegible] Amp. après ½ heure eau garnie.
Exp. de l'eau chaude à 60° 1150
A partir de ce jour à 2 P.M. [illegible] insérée
ajusté lumière-moitié à 2° avec cyl., nouveau
[illegible] un nouveau cyl. à 4.30; manivelle
[illegible] à 1° et pour 10 min. à 4½°

Experiments on Recorders for Piano

March 1894

113. R. Blüthner 15" 10 D. pressed to 7 — Hc
Stuffed under felt. Good — experiment

113. R.Bl. 15" 8 D. pressed to 5 — B
Norwegian Bridal Procession ok.

114. R.Bl. 15" 14 Disp. [illegible] — [illegible]
[illegible] with 12 glass Damper.
[illegible]
3. [illegible] with felted Brass Damper [illegible] small.
[illegible]
4. [illegible] with brass [illegible] on [illegible]
and glass damper (Bl.) Very good. first experiment

115 a. 15" # 6 Disp. with Aluminium - spider
[illegible] — R.B. experiment —
b. no damper # 6 Disp. with Cadmium & Nickel Pottering
c. [illegible] with [illegible], [illegible]
The same Disp. with Aluminium w/o Damper - muffled [illegible]
by nothing.

116 a. [illegible] with a 13/16 # 6. (c)
at 15" very good
b. at 15" fair very bad.

117 Newport Variations
from electric. at 116 8" Dist.
a. Short funnel, large and covered with 5/32 tin-tube
Record good, very slightly dull. no x-plosions
b. long funnel; Record slightly sharper no x-p.

118. Two funnel arrangement — a b
Norwegian Bridal Procession — played on Steinway
a with both funnels - ok not very loud
b. with one funnel and b stopped off. muffled

119 Both funnels at about 6" Distance from St. Piano
not very loud.

120. Edison Phonograph Pitch
a. with 2 funnel-Arrgt. at 12 ft Distance (ok)
b. with Pigeon-hole funnel at same " (louder)

100 Zitter-Solo with old funnel Hc 00 Disp. (Damper)

106 Melrose polka with 6 Disp. and Damper
at 9", 9', and 15' Distance.

210. a. Prince Bismarck March # 6 Disp. Damper with small cover
b. Hoch Nordberg Zitter Verein

211. a. Darling courtship March 18th 94
b. Fleeting moments

202 Song & Recitation by Emily Watts
Piano by Miss [illegible]

March 20 2d 1894

203 Wigwiggy Winds on Blasting Pains (red)

8 Damper. Damper with large Circle

204 " " # 6 " OK " " "

March 28 th 94

Experiments with Ingersoll funnel and Spring-damper Recorders. Diaphragms 4½ to 5½

130 Old Funnel. Stinway Rec # 1 Rig Blast off Without Damper up.

131 P.H. Funnel Rig Blasting - dials - " "

132 " Cummings " " Pat Spring " 2

133 a " " O.K. " " OK " " 3

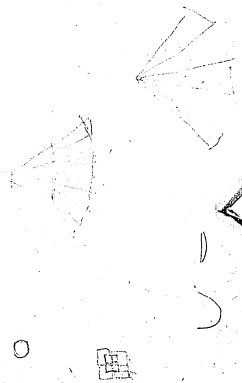
" 6. " " " " " " 4

134 a. " " magnified " " " 75 with Damper

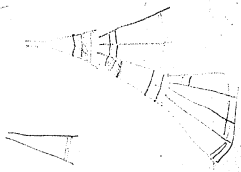
6. " " " " " " without "

135 a OK (Cinder) " " 76 with Damper

6. explosion " " 71 with Damper (round circle)



1 — Divided into 4
Each of first 4 divided again into 4



10-21-94

Reades # 6 (Pivot)	Diapason	5 ft	2 Dyell Robbins		30 in	Treble
" 2	gray	"	5 ft	7 " foot "	21	" "
4	"	"	5 ft	2 nice tight "	46	" "
3	"	"	5 ft	2 dyell [illegible]	64	" "
6			5	/ nice tight	70	
5	"		5 ft	/ Reeves	33	" "

136 a # 6 muffed and rattling
6. # 5 ok [illegible]
137 a # 3 [illegible]
6 # 2 [illegible]
~~138~~ a # 1 [illegible] good
6 # 4 OK [illegible] # 5

~~139~~ The above reeds were taken with the 5 stopping balanced PH pipe at about 15" pressure.
Steinway - Piano

139 Rippling waves. OK.
4 Recorder. Steinway 8". 5th P.H.T.

140. Rippling waves. OK
Every thing the same, added grass damper.

~~141~~ Rippling waves, OK
Recorder # 5. Same F. and D.T.

142. Rippling Waves
Rec. # 5. and Tin. Disk, C.
not as good as 141

143 Hard rubber, mouthpiece uncovered all the above Records
Dia Tubes. Steinway. 24"
1 # 6 Recorder, changed rubber cushions to prior
Diameter 15/16 (very soft). Brass fixed mouth piece
& Tubes.

144 Die Trieste
6 Recd. ~~Brass HRMP~~ HRMP. R. Diameter 24"
Speak 140. Cushions covered down slight.
N.G.

145 Rippling waves. Steinway
7" grains [illegible] to mouth piece [illegible]
Tube to Diaphr. = Voice clear.
Piano clear, but far away.

146 Tuned. 9 on Diaphr. [illegible]
[illegible] Steinway OK.
Rec. Same as same F.R.M.P. Distance 20" and Recorder # 5

April 25th 94

O.K Recorder # 2. Diameter .085 Tub. .007 Diaphr. [illegible]
" 3. " " .065 " "
3 OK on Oak Diaphr. rubber [illegible] on Rec. Diaphr.

Recorder # 6. Diameter .088. Cushions .030 Diameter, .23 Tubing (M.R.H.P.)
Cap. fast

April 26

146 Rec. # 6. .088 Diaphr. [illegible]
" " 2. .087 "
" " 3. .085 "
" " 4. .085 " [illegible]
" " 5. .085 " [illegible]

148. Apr. 27.

Recorder # 3. .006 Diaphr. additional Damper & ring

1.) [illegible] rattling but very much ring in the Pond.

2. a little less rattling, sound clearer

3. 3.

Records any difference between

4. all of the [illegible]

5.)

6.) Combination of # 2 & 5.

all made very [illegible]

149. 15 part. Combination # 6 OK

25 " Diaphr. # 2 more rattling & louder.

150 Whispering Winds Combination # 6 Recorder # 3. R. Blas

151 Rippling Waves Recd. # 2 beautiful

152 Moravika Recorder # 3 without additional damper

1 part on Oak Blasius

2 " " Mahogany "

78 loud but rattling and muffled

153 Silversteins Moravika Rec # 1 clear and no

expression but not very loud Steinway

153 B. Ditto 24. Rec # (14) loud but rattling.

154 Ditto & Blas. Rec. # 3 (Comb. 6) rattling

153. III " " Childrens song 10R

157 Andante Sonata 2 op Beethoven. Duo for Piano & Violin

played by Kindermann Dreesen & Reinecke & Grunsland

Diaphr # 2 (soft) very Lovely but clear & sharp.

160 Don Sebastiano. Duo by Heller & Ernst

Played by Mr. & Miss L. Paul [illegible]

Diaphr # 6. Steel rubber stiffness .003 gauge 5/8 Diam.

Record distinct and sharp like muffled.

The same Recorder # 6. with a diaphragm of stocking linen of .003 thickness. glued with oil and dust side of lock .006 gauge center ½" Diam.

not better nor worse than .005 gauge. rattling on some notes and muffled

Recorder # 4. Diaphragm of silk Pigs-gut oiled

Very sensitive but not better than .006 gauge

a little rattling at first notes of Scale.

Diaphragms of oiled silk and gold-beaters skin are not good; can not be distributed tight enough

162 Pigeon Hole Funnel. Recorder # 5
Prince Rupprecht's March. Zither Duet: Kinsella

164 Same Funnel & Recorder
a. Lucia Sextet Dimondon — Cecil Kinsella (OK)
b. Smoky Glass-funnel

163 old funnel; same Recorder (OK)
I and not Bua

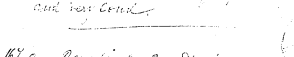
165 Old funnel; same recorder (OK)
a. Die Stille: Zither duett
b. The happy musician — B.B.C. Quartet

166. Silver-to-Steel March — Blaring Piano
P.H. Funnel. 46" Dia. Recorder # 6 Diaphragm .003
Old Guinea Diaphragm. Heavy Stiffener. N.G. Rattling.

166 Recorder # 5. .006 normal damper springs, fast staccato very little rattle and rattling.

b. Recorder # 4. .006. with glass-strips. soft rubber cushion on top of bamboo-post.
first part: Sacred Shulton — rattling
second part: Track of [illegible] — low rattling and low [illegible]

166 c. Recorder # 2. Diaphragm .005.
.006, on the lower side with on top layer of [illegible] and radial rays over it. — no effect rattling.
b added on central heavy layer on top side 7/4" Diam. 3/8 wide. no effect
c altered shape of stopper-cap from 1 to 2 — less rattling

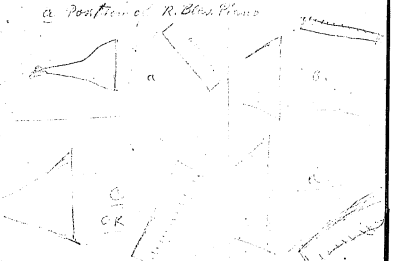


d. added 4 small rubber cushions at 1234. — much less sensitive. no rattling. Sextet
Regular stylus - high angle

165. [illegible] March!

Recorder #6 Gilt-Drafts. H.H. Tuo.

a Position of R. Blow Piano



169 Liberty Bell-March Blasius P.

Recorder #5 .0055 Drafts. [illegible] Stopped

Position C of Piano. Tunnel hammered

and covered with Some-lace

no cork no ringing

170 Liberty Bell March. Steinway. oblique

hard wax, [illegible] Stopped right angles (Mar #3)

no rattling ——— no swell

no ringing sound

171 Silver Tears. Blasius. Position C 18" [illegible] 38"

a Recorder #6 .008 Drafts. no ringing sound

b. Rec #2. Double Graftes. .0055 OK

the upper one clear, the lower covered with Rubber-glove.

172. Noir. Bribed procession. Blasius. C.

Recorder #2 [illegible]

173 Whispering Winds Blasius removed [illegible]

174 Rippling waves Blasius C

Recorder #1. .005 Drafts. [illegible] Stopped

damper-spring Light. OK a little muffled.

175 " " .0055 OK a little [illegible]

176 " " [illegible] Stopped with [illegible] muffler.

177 Die Forelle [illegible] " " Blasius

Nov. 13.

175. Replaced with [illegible] under Stopped spring by

bamboo-[illegible] a little less muffled. Blasius

but a little rattling [illegible] as before

177 Whispering winds Steinway. Rec #1. OK

178 Die Forelle OK " " " "

Recorder # 1. .006 Diop.
" # 2. .0055 " Auto cover
" # 3 .0055
May. 16. " # 4 .006.
" # 5 .0055
" # 6 .008.

179. a. Aurora
b. Rippling Waves

Recr # 3 A

no scratch, nothing else.
not muffled. not muffling

May 16. Steinway

35 Recorder # 7 Diop. .007. Small-Stylus.
Silber-Bassier-Spice - OK Steinway
Liberty-bell-march. Recorder - [illegible]
no muffling, no overtones

~~181. Whispering Winds~~ Rippling waves

Recorder # 8. .006 Diop. Bamboo-Spr.
special blue sapphire. Auto cover, angle same
as # 7. - Condition but a little squeaking.

182 Chopin. Waltz.
Recorder # 8. changed .006 Diop. for. every thing
Very else the same. Auto a little cover
a little, rattling and rattlety.

May 17th 14

181. Whispering Winds
a. Recorder # 1. a little muffled
b. " # 7 cleaner but a little scratchy

182a Recorder # 2. Diop. .0065 Over thickness
Bamboo Special blue stylus. Bamboo-Damper giving
b. Rec # 7 OK (without damper) a little muffled

Recorder # 4. Bamboo spice not particular to
operation.

183 Rippling Waves. a. Recorder # 8. with nothing
1. [illegible] [illegible] [illegible]
round [illegible] [illegible]
Recommend no muffler.

180. Liberty-bell-march Recorder # 3
not the machine. No overtones. The spice
Bamboo the sound is not quite as large as the
wood end. [illegible]

184 Chopin Polonaise Recorder # 8.
Loud without rattling.

185 Rippling Waves Rec. # 8 Diop. .0065

May 27.

Recorder # 9. Diaphr. .0005. Diam .015

" " 8. " .0060 " 20 Clear Diaphr.

" " 7 " .0007 " 20 Clear Diaphr.

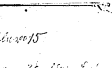
" " 6 " .00053 " 20

" " 10. " .005 20 Clear D.

141 Repeating Wave Recorder = 6. spider-leg.

Clear without splitting, but not very clear

186 Repeating Wind S. Rec. # 6



June 1. 94

[illegible] 10. [illegible]

[illegible] Diaphr. 1/16 [illegible] splitting and muffled

[illegible] " 1/16 " " "

C. " " " " 1/16 Diaphr. very tight

176 The same with glass Diaphr. on [illegible] n.g.

June 4th 94

Recorder # 2. Thickness Diaphr. .004 cemented on both sides, with .010 glass & rotation 1/8 from rotating ring (upper glass gritted) muffled & splitting

189 Diaphr of Silk-gauze glass .012. 3/32 Diam.

a no 2 lined

[illegible] Silk Diaphr. glass .010. 1" Diam. No silk

b. between the glass disk and the retaining ring to left not with oil.

a little louder, also a little rattling.

C. Skin .001. glass .012 3/32 Diam. glass with dim. and ring oiled. — loud but rattling.

187 Diaphr Valve. Rec # 10. Diaphr .001 thick with .010 glass 6 1/64 Diam. Clear but splitting

188. The same. Tracheal tube deeper and Diaphr. tightened more. OK !!!

185 Stethoscope. Splitting muffled. Diaphr very tight

176. Wheezing [illegible] Cord & rubber

141 a Stethoscope Diaphr .005. with .010 glass disk 1" Diam on one side and 15/32 D. on the other. not tested

b. Recorder # 4. .006 Diaphr with Bower-Barff (BB)

Jumper spring very tight O.K

Called by Lehmann

June 9th 1894

Warm bright white Chopin

190 Receiver No. 2. Diaphragm .0045 hole in cap 1/4". 1 chamois cushion below 2 above screwed down very tight. Steinway P. P.H. Funnel OK. soft and full. no splitting.

191 The same with 40 obl. funnel inside the Very loud, but not so sweet as 190 (Tiny piano) no splitting

194. The same with Cap 3/8 helical more air-space between Diaph and Cap.

4. P.H.F. not as loud as 190,

June 11th

Receiver No 3. Diaphragm of stiff felt .050 thick with glass-centre 5/16 Diam. .010 thick. Round faint but distinct.

192. Diaph. of felt .050, paper hot h. .017 glass-centre of a 1/4" Diam. .010 thick. Recd. a little louder

b. Felt of .040 of a little softer, somewhat thick added on the rough side and covered with linen-paper, pressed hot h. .011. Clearer and louder than a

June 13. 94

192a

Receiver No 10. Diaph of black india-rubber sheeting with glass-centre .0065 thick 15/16 Diam. Vibr. Diam. 15/64 loud but not very sensitive.

193 The same with glass centre 1/4" Diam. Very sensitive, a little better

a. old funnel

b. P.H.F. funnel. (less mellow)

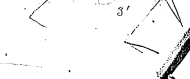
194. Receiver No 4 Diaph glass .003 – 1 1/16. Hole in cap 3/16

a Very sensitive and clear. no squeaks.

One chamois cushion on each side and screwed down medium tight. The 3/8 Chopin stand also sounds to the P.H. Funnel.

for a – 1

for b. – 2



b Very loud & clear

June 15th 94

195 Telephone Valve (Warner) Blessing, (Cleveland)

Receiver No 4 Diaph of wyke Lt. Unbleached and pressed .037 and covered on rough side with linen .0005 thick. Sounds a little muffled but very loud but distinct

936 June 15th

Blaiguin 9 h. 11 m

2 ch. Recorder # 10. Chrom Valve [illegible]
Diaphs of rubber coated muslin .005) with glass centre
[illegible] 1.830. Loud & clear (a little yielding.) OK.

112 Recorder #10. Rubber coated muslin with glass centre .010 × .925. Speaking at a distance of 37 feet from Phonogr. piano and loud
Selection on Weber Piano at 22 feet from Phonog. sounds louder than speech.
[illegible]
[illegible] same as 112 [illegible]
136 [illegible]

June 16th

Recorder # 3. Diaphs of black rubber .019 thick not [illegible] glass.

117 Recorder # [illegible] Diaphs. [illegible] 1/16 Diam. .007 thick
Outlook [illegible] OK.

June 22nd 1894

112 a Small Diaphs. of felt 1/16 Diam. 3/64 thick 19/32 hole covered with glass diaphs. .825 D. .010 thick very low-note No. 9.

b. Regular size Diaphs. of hard felt (white Piano felt)

with glass centre .010 × .500.
a little louder but rattling and muffled.

119 a Small diaphs. of felt

covered with glass centre .008 × 11/16
not [illegible] loud [illegible]

b. Regular size Diaphs of hard white felt 1/16 thick covered on top with tissue-paper [illegible] and held down with a wire-spring

the cap is off the felt 180°. Very faint and muffled at the lower notes.
a little clearer at the high notes.

c. The cap is screwed down so that it bears slightly on the chromo cushion-ring.
a little clearer but not much louder

June 22. Rec. #3 Blaring funnel, [illegible] 7th"

132 Small diaph. felt .050. 1 1/16 outside diam. 9/16 hole

glass centre .010 × 11/16. small hole in

diaph. cap. (3/16)

Andante Adagio O.K. [illegible]

June 23rd Recorder #4 Felt-Ring diaph. Glass-centre $\frac{15}{16}$ (.010)

Felt Thick, .285 Wide

Glass diaph. on the lower side. [illegible]

126 — [illegible]

Felt Ring .061 thick .250 Wide Glass diaph. .011 × $\frac{31}{32}$

glass on the lower side. [illegible]

June 23rd

196 Andante Adagio [illegible] #6)

Felt ring .082 thick, .0300 wide. Glass. .0115 × .857.

glass low. OK. [illegible])

197 Valse Brillante Cho. in [illegible] #3.) [illegible]

June 14th

Vivace Cello

198 a Recorder #2. Loud & clear

b " " #3. Much too loud.

[illegible] 80.

[illegible] Recorder #11 [illegible] No. 1st .014 thick

cushions [illegible] thick [illegible]

a. diaph. [illegible] between cushions [illegible]

b. cushion [illegible] down to [illegible]

very low.

c. [illegible] diaph. [illegible] very low. very.

100 Vivace 1st .007 thick.

centre [illegible]

a. [illegible] [illegible]

very [illegible] [illegible]

Good Records.

1.1.	203.	Wisp. Winds.	March 23.	1894	R.L.
1	159	Andante Sotto voce	May 8		P.D.
1	163	I and mei Dea	" 13		
2	184	Chopin's Polonaise	" 17		R.L.
2	182	Silver-Stars	" 17		—
3	35	Liberty Bells March	" 16		
3	128	Die Fualler	" 16		
2	101	Norw. Bridal Procession	March 9		
1	100	Zittes, Prinz Bismarck, &c.	" 18		
2	186	Wisp. Winds	May 25		
1	185	Rippling Waves	" 17		
1	117	Andante Adagio	June 15		
1	190	Chopin Waltz	" 9		

July 6th 1894

Recommence opérer des représentations à chaud

6 et 7 14h. Préparations.

B Boiler
C core
T tank

Imp 16th to 21. Moules F et 54.

54. 3. B 121
C 113
T 102
45 m

F3. C 120
30 m.

C 118
40 m

M1. C. 117
B. 129 n.g.
25 m.

4. C. 115
30 m

7. C 117
B 124
T 98
30 m.

M2. Temp. in room 95
Tested from 4 to 7.45 P.M.
4. C. 115
C. 115
35 m.

5. C. 115
T 102
B. 119
40 m

C. 117
35 m

6. C. 114

8. C. 115
B 120
35 m

3. C. 125
20 m

7. C. 112
B. 124
50 m.

9. C. 114
B 124
35 m.

4. C. 123
20 m

5. C.

10. C. 115
30

5. 118. 35 m

54. 10. C. 115
45 m.

11. C. 115
30

30. C. 119
T 108
B 129
25 m.

30₃ 119. 28 m

30₄ 120. 20 m

11. 115
35

12 115
35

13 115
35

F 12. C. 117
B. 125
T 102
50 m.

Mould has been in ice-box overnight. Cyl. turned up, 008 larger than mould. Boiler pressing could not go to 15 m. Tank in not much solution

F 13 C. 117
30 m.

Boiled the core after pressing.

14. C 117
35

15. C. 117
T 102
B. 119
40 m

The mould was held 10 m in the T before immersing on top hot H.O.

15. C. 116.5
B. 128.
32 m.

23 119 – 25 m

24. 115. 28.
25. 119. 25

31. C. 122. 22 m

32. 2. Washed mould with water
C. 121. 20 m

17. C 114
35

18. C. 117. T 110.
30 m.

26. B 130
T 117
C
20 m.

19. C. 120. T 110
35 m

27. 119. 23 m

20. C. 119
20 m.

28. 120. 25. Put the hot water in the core and dipped the whole mould in ice water for 2 minutes, before taking out the core

21. C. 119.
25 m.

22. C. 119½ 20 m

29 the same.

Cleaned & clean

54. 11. C. 115½
B 118
35 m.

15. C. 116½
C 35 m.

16. C. 115 T 110
20. 30. m.

B. 125

17. C. 120
T 110.
20 m.

18. C. 119
20 m.

19. 115
25

20 115
25

21. 112
25

22. 112
30

23 118
25

24. B 130
T 117
C 119
22 m

25. C/20 22 m

26. C 120 25.
Cooled in mould before removing

(Sh. 16) The mould was left in the T for 20 m. before turning on the hot H.O.

July 23 — 25.

54. 27. C. 119
Stn OK
after 25 m
B. 130
T 113
25 m

28 C. 118
cooled c. 30 m

29. Cooled the mould in ice water before inserting Cyl.
C. 120. 25 m

30 C. 118. 30 m
mould not cooled before inserting cyl.

31. C. 120. 30 m

32. C. 118. 30 m

33 C. 119. 40 m

34. C. 118
B 129
T 114
25 m

35. 113. 25

36 C. 120. 20
cleaned only with steel

37 C. 118 27

38. C. 117. 25

39 C. 117. 25
cleaned only with steel after removal

40. 118. 25

41. B. 118½
T 114
C 118
35 m

42. 117½. 25

43. 120. 25

44. 120. 25
45. 123½. 20

46. 122. 20

47. B 117
T 110
C. 120. 20 m
48. C 117. 18 m

49. B 137
T 118
C 125
18

50 124½
18 m

51. 125. 20

52. 125. 20

53 125. 20

54. 125. 20

55 124. 20

56 124. 20

57 123. 20

58. B. 137
T. 120
C 125. 27 m

59. C. 124. 20 m

60. C. 126. 18 m

61 C. 127. 17

62 C. 126. 18

63. 125. 20

64 126. 18

65. 125. 20.

66 125. 20

67. 125. 20
T 113
B 134

68. B 138½

July 28 T 118
C 127. 20

69. 127. 18

70. 128. 18

71. 127. 18

72 126. 18

July. 23. 94. T-Mould. 7

July 23

T 30. C. 120
B 13 L
T 115
30 m

31 C. 119
B 130
T 113
35

32. C. 118 cooled 30. before.

33. cooled mould before inserting Cyl.
C 120. 25 m.

34. Before T 30 m before turning on Hot H.O.
C. 122. 20 m

35 C. 118½ 30 m

36. C. 119. 30

38. C. 119. 20

39. C. 118
B 129
T 114
25 m

40. C. 118. 25

41. C. 118. 28

42. B. 118. 28.
mould cooled before inserting Cyl.

43. 118. 25

B 117½. 25

The core was not cooled before withdrawing from mould. 44 30. 1. 31 and 54. 27.

For 32. The stone was turned off at 75° F 27.0 and the core cooled off before removal.

44. 119. 27 m

45. B. 118½
T. 114
C. 118
40 m

46. 117½. 30.

47. 121½. 20
48. 122. 20

49. 121. 20
50. 122. 20

51. 123. 20

52. 123½. 20

53. B 137
T 110
C. 125
15 m

54 B 137
T 118
C. 126
22 m

55 125. 2 m

56. 125. 20 m

57 126½. 20 m

58 128. 18

59. 126. 20

60. 125. 20 m

61. 125. 20 m

62. 125. 20 m

63. B 137
T 120
C 120
20 m

64 C. 125. 22

65. C. 127. 17

66. C 126. 18

67 C 126. 18

68. C. 126. 18

69. C. 126. 18

70. C. 126. 18

71. C 126. 19

72 C 125. 18 m
C 124

73 C. 128. 18
T 118
Sub. B 138

74. 127. 18 m

75. 129. 17 m

76 127. 18

77 127. 18

930 A
B 140
C 130
T 110
30 m
74. 126.19
75 126.18
76 125.20
77 118.20
78 127.20
79. 122.20
80. 127.18
81. 127.18
82. 126.18
83. 126.17
84. 125.19
85. 125.20
86. 125.19
87. 122.19
88. 126.20
89. 123.22
90. 123.20
91. 116.20
92. 125.20
93. 129.16
94. 130.15
95. 128.17
96. 127.19
97. 127.19
98. 128.17
99. 128.17

100 127.20
101. 129.22
not marked
102. 129.18
103. 128.19
104. 124.22
105. 122.25
106. 120.24
107 125.20
108 125.20
109 124.20
110. 124.20
111 124.15
112. 124.20
113. 124.20
114. 124.20
115. 124.20
116. 125.20
117. 124.20 (OR)
118. 124.20
119. 125.25
120 125.20
121. 124.20
122. 123-25
B 120. T 115
123. 123.22
124. 125.20
125. 126.18
126. 125.18
1 126.19

Aug. 5.94
B 6
C. 125.30
B. 128 T 110
127. 125.20
128. 125.20
129. 125.20
130 126.18
131 125.20
132. 126.18
133. 127.18
134. 126.18
135. B. 135 C
T 119
C. 124.24
All checked with HO.
136 R 122.25)-20
137. 124. 20
Worked in 3 Iterations
with geologist and HO.
138. 126. 25
Worked in 3 Iterations
2 observers and HO.
part month in succession
while waiting for HO.
strength ed.
139. 126.12
140.
checked only with
Iterations 2 observers
141. 124. 20
142 125.20
143. 128.15
144. 127.19

Aug. 16
54. 1965.
C. 124. 25 m
146. 123.20 m
147. 124.20
148. 123.20
149. 123.20
150. 122.20
151. 123.20

105. 127.20
106. 125.18
107. 128.18
108. 125.20
109. 123.22
110. 127.18
111. 127.18
112. 126.18
113. 125.20
114. 124.23
115. 124.20
116. 124.20
117. 124.20
118. 124.20
119. 124.20
120. 124.22
121. 125.20
122. 124.20
123. 124.20
124. 124.22
125. 124.22
126. 126.18 (OR)
127. 123.20
128. 125.22
129. 125.20
130. 125.18
131. 127.12
132. 126.18
133. 125.20
134. 125.20
135. 124.20
136. 125.18
137. 124.20
138. 124.20
139. 124.20
140. 125.20
141 126.18
142. B 105 C
T 119
C 124.25 m
Worked with HO.
143. 124.20 (R)
144. 126.18 R
145 125.20
146. 124.20
147. 122.20 R
148. 122.25
149. 125.20
150. 125.20
151. 126.25
151. B 135
T
C 115.20
153 124.22
154. 124.20
155. 125.20
156. 124.20
157. 124.20
158. 124.20

Aug. 6. 94
132. 127.20
B 128 T 111
133. 125.24
134. 125.20
135. 124.20
136. 125.18
137. 124.20
138. 124.20
139 124.20
140. 125.20
141 126.18
142. B 105 C
T 119
C 124.25 m
Worked with HO.
143. 124.20 (R)
144. 126.18 R
145 125.20
146. 124.20
147. 122.20 R
148. 122.25
149. 125.20
150. 125.20
151. 126.25
151. B 135
T
C 115.20
153 124.22
154. 124.20
155. 125.20
156. 124.20
157. 124.20
158. 124.20

Aug. 9.
163. B. 143.
T 124
C. 128. 15m
164. 128.20
165. 127.15
166. 127.17
167. 127.17
168. 127.17
169. 132.17
170. 128.15
171. 128.15
172. 129.14
173. 127.17
Worked with Theodolite
and HO. only.
174. 129.15
175. 128.16
176. 129.14
177. 127.17
178. 125.20
179. 125.20
180. 127.17
181. 128.17
182. 127 17
183. 128. 17
184. 129. 15
185. 127. 18
186. 129. 15
187. 130. 14
188. 129. 15
189. 129. 15

Aug. 11th 1894

F. 190. B. 136
T. 100
C. 124.22

Ad. 123½ 24. ser.

190. 125. 22.
192. 123. 20.
196 124. 20.
198. 120. 32 Aug. 13
196. 125. 20.
197. 123. 20.
198. 125. 20.
199. 124. 20
200. 124. 20
201. 126. 18.
202. 126.020
203 127. 18
204. 127. 22.
205. 127. 18
206. 124. 20
207. 126. 20
208. 124. 20
209. 124. 20
210. 123. 20
211. 123. 17
212. 124. 20
213. 130. 16
214. 126. 20
215. 127. 20
216. 125. 20

217. 125. 20
218. 124. 20
219. 123. 20
220. 121. 05

Aug. 20. Ad.

221. C. 125. 24
222 124. 20
223 124. 20
224 125. 20
225. 122. 22
226 124. 20
227 124. 20
228. 127. 20
229. 123. 20
230. 123. 20
231. 122. 20
232. 123. 22
233. 124. 20
234. ~~123. 20~~
235 124. 20
236. 123½. 21
237. 123. 20
238. 122. 22
239. 123. 18
240. 124. 20

234. 125. 18
model not attended at all.
opt. decay

Planes received
Aug. 15–18
" 120.
" 101
" 222

Aug. 22. 1894

241. 123. 28
242. 124. 20
243. 123. 20
244. 125. 18
245. 123½ 20
246. 123½ 20
247. 123. 20
248. 123½ 20
249. 125. 18
250. 124. 20
251. 124. 20
252. 124. 20
253. 125. 20 Model
254. 126. 18
255. 125. 20
256. 125. 20 not received
257. 125. 20
258. 125. 20 Ad.
259. 125. 20
260. 124. 20 ob.
261. 124. 20
262. 123. 20
263 123. 20
264. 123. 20
265. 127. 22. model
266 125. 20 "
267 124½ 20 (model)
268. 124. 20.
269. 123. 20 ne.
270. 123 20 ob.
271. 125. 20 ob.
272. 124. 20 "
273. 125. 20 "
274. 126. 20 "
275. 125. 20 "
276. 123. 20 ne
277. 124. 20 ob.
278. 124. 20 ob.
279. 124. 20 "
280. 124. 20 ob.
281. 125. 20 ob.
282. 125. 20 ob.
283. 124. 20 ob.

Aug. 27th.

284. 125. 22 ob.
285. 125. 20 ne. 333. 125. 20
286. 124. 20 ob. 334. 124. 20
287. 121. 20 ne. 335. 123. 20
288. 120. 20 ob. 336. 121. 20
289. 121. 20 " 337. 123. 20
290. 121. 20 " 338. 121. 20
291. 121. 25 " 339. 121. 20
292. 120. 20 " 340. 120. 20
293. 120. 20 " 341. 120. 20
294. 122. 20 " 342. 120. 20
295. 120. 20 " 343. 120. 20
296. 120. 20 " 344. 120. 20
297. 122. 20 " 345. 125. 20
298. 121. 20 " 346. 124. 20
299. 121. 20 " 347. 122. 20
300. 121. 20 " 348. 122. 20
301. 121. 20 " 349. 122. 20
302. 121. 20 " 350. 122. 20
303. 121. 20 "
304. 121. 20 "
305. 121. 20 "
306. 120. 20 "
307. 122. 20 "
308. 123. 20 "
309. 122. 20 "
310. 122. 20 "
311. 120. 20 "
312. 121. 20 "
313. 121. 20 "
314. 121. 20 "
315. 121. 20 "
316. 121. 20 "
317. 121. 20 "
318. 121. 20
319. 121. 20

320. 122. 20.
321. 121. 20
322. 120. 20
323. 120. 20
324. 121. 20
325. 122. 20
326. 124. 20
327. 121. 20
328. 121. 20 TC.
329. 121. 20 ob.
330. 120. 20

331. 119. 20
332. 121. 17
333. 125. 20
334. 124. 20
335. 123. 20
336. 121. 20
337. 123. 20
338. 121. 20
339. 121. 20
340. 120. 20
341. 120. 20
342. 120. 20
343. 120. 20
344. 120. 20
345. 125. 20
346. 124. 20
347. 122. 20
348. 122. 20
349. 122. 20
350. 122. 20

Aug. 29. 1894
351. 119. 20
352. 123. 25.
353. 121. 20
354. 123. 20
355. 122. 20
356. 120. 20
357. 120. 20
358. 120. 20
359. 120. 20
360. 120. 20
361. 120. 20
362. 123. 20
363. 121. 20
364. 120. 20
365. 121. 20
366. 121. 20. model
367. 121. 20
368. 120. 20
369. 120. 20
370. 120. 20
371. 122. 20
372. 121. 20
373. 131. 15
374. 130. 20
375. 121. 20
376. 120. 20
377. 121. 20

378. 121. 20
379. 120. 20
380. 120. 20
381. 120. 20
382. 118. 20
383. 113. 20
384. 123. 20
385. 121. 20
386. 120. 20
387. 120. 20
388. 120. 20
389. 119. 20
390. 119. 20
391. 120. 20
392. 119. 20
393. 123. 20
394. 120. 20
395. 125. 20
396. 123. 20
397. 121. 20
398. 122. 20
399. 121. 20
400. 120. 20
401. 119. 20
402. 118. 20
403. 121. 20
404. 122. 20
405. 122. 20
406. 120. 20
407. 119. 20
408. 117. 20
409. 119. 20
410. 120. 20
411. 119. 20
412. 120. 20
413. 123. 20
414. 124. 20
415. 119. 20
416. 125. 20
417. 123. 20
418. 123. 20
419. 123. 20
420. 123. 20
421. 121. 20
422. 124. 20
423. 124. 20

Sept 21	468.122.20	512.113.30	Oct. 29	611.126.20	
424.120.20	469.123.20	513.126.20	374.122.20	612.126.20	
425.120.20	470.126.20	514.124.20	337.120.20	613.126.20	
426.115.20	471.123.20	515.123.20	338.123.20	614.126.20	
427.123.20	472.123.20	516.119.25	339.125.20	615.128.20	
428.124.20	473.123.20	517.121.20	340.124.20	616.128.20	
429.121.20	474.122.20	518.123.20	341.121.20	617.121.20	
430.121.20	475.124.20	519.121.30	342.123.20	618.121.20	
431.121.20	Oct. 12, 1894	520.120.20	343.125.20	Nov. 5, 1894	
432.120.20	476.115.30	521.121.30	344.120.20	619.126.20	
433.120.20	477.115.20	522.123.20	345.120.20	620.126.20	
434.120.20	478.118.25	523.120.20	346.123.20	621.123.20	
435.121.20	479.120.20	524.123.20	347.120.20	622.125.20	
436.122.20	480.120.20	525.123.20	348.123.20	623.123.20	
437.120.20	481.123.20	526.116.30	349.120.20	624.120.20	
438.120.20	482.123.20	527.123.20	350.120.20	625.120.20	
439.122.20	483.126.20	528.123.20	351.124.20	626.120.20	
440.122.20	484.117.20	529.124.20	352.125.20	627.126.20	
441.124.20	485.120.20	530.124.20	353.124.20	628.125.20	
442.123.20	486.120.20	531.123.20	354.124.20	629.126.30	
Sept 24	487.123.20	532.123.20	355.124.20	630.123.20	
443.119.25	Oct. 15	533.123.20	356.122.20	631.123.20	
444.119.20	488.120.30	534.124.20	357.122.20	632.124.20	
445.120.20	489.120.20	535.124.20	358.122.20	633.125.20	
446.120.20	490.125.20	Oct. 25, 1894	359.122.20	634.120.20	
447.123.20	491.122.20	536.115.30	360.124.20	635.120.20	
448.120.20	492.123.20	537.121.20	361.124.20	636.120.20	
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450.120.20	494.120.20	539.123.20	363.124.20	638.123.20	
451.119.20	495.125.20	540.125.25	364.124.20	639.123.20	
452.123.20	496.123.20	541.123.20	365.124.20	640.123.20	
453.123.20	497.122.20	542.123.20	366.124.20	641.123.20	
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455.122.20	499.124.20	544.124.20	368.124.20	643.123.20	
456.124.20	500.123.20	545.124.20	369.124.20	644.123.20	
457.124.20	501.123.20	546.122.20	370.124.20	645.123.20	
458.124.20	502.124.20	547.122.20	371.124.20	646.123.20	
459.123.20	503.123.20	548.122.20	372.124.20	647.124.20	
460.123.20	504.123.20	549.124.20	373.124.20	648.124.20	
461.124.20	505.123.20	550.124.20	374.124.20	649.124.20	
462.123.20	506.123.20	551.122.20	375.124.20	650.124.20	
463.124.20	507.123.20	552.122.20	376.124.20	651.124.20	
464.123.20	508.123.20	553.122.20	377.124.20	652.124.20	
465.124.20	509.124.20	554.122.20	378.124.20	653.124.20	
466.120.20	510.124.20	555.122.20	379.124.20	654.124.20	
467.123.20	511.124.20	556.122.20	380.124.20	655.124.20	
468.122.20	512.123.20	557.122.20	381.124.20	656.124.20	
469.123.20	513.126.20	558.122.20	382.124.20	657.124.20	
470.126.20	514.124.20	559.122.20	383.124.20	658.124.20	
471.123.20	515.123.20	560.124.20	384.124.20	659.124.20	
472.123.20	516.119.25	561.124.20	385.124.20	660.124.20	
473.123.20	517.121.20	562.124.20	386.124.20	661.124.20	
474.122.20	518.123.20	563.125.20	387.124.20	662.124.20	
475.124.20	519.121.30	564.120.20	388.124.20	663.124.20	
Oct. 12, 1894	520.120.20	565.120.20	389.124.20	664.124.20	
476.115.30	521.121.30	566.120.20	390.124.20	665.124.20	
477.115.20	522.123.20	567.120.20	391.124.20	666.124.20	
478.118.25	523.120.20	568.125.20	392.124.20	667.124.20	
479.120.20	524.123.20	569.124.20	393.124.20	668.124.20	
480.120.20	525.123.20	570.122.20	394.124.20	669.124.20	
481.123.20	526.116.30	571.123.20	395.124.20	670.124.20	
482.123.20	527.123.20	572.123.20	396.124.20	671.124.20	
483.126.20	528.123.20	573.124.20	397.124.20	672.124.20	
484.117.20	529.124.20	574.124.20	398.124.20	673.124.20	
485.120.20	530.124.20	575.124.20	399.124.20	674.124.20	
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488.120.20	533.123.20	578.122.20	402.124.20	677.124.20	
489.120.20	534.124.20	579.122.20	403.124.20	678.124.20	
490.125.20	535.124.20	580.122.20	404.124.20	679.124.20	
491.122.20	Oct. 25, 1894	581.122.20	405.124.20	680.124.20	
492.123.20	536.115.30	582.122.20	406.124.20	681.124.20	
493.120.20	537.121.20	583.124.20	407.124.20	682.124.20	
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495.125.20	539.123.20	585.124.20	409.124.20	684.124.20	
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502.124.20	546.122.20	592.124.20	416.124.20	691.124.20	
503.123.20	547.122.20	593.124.20	417.124.20	692.124.20	
504.123.20	548.122.20	594.124.20	418.124.20	693.124.20	
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507.123.20	551.122.20	597.124.20	421.124.20	696.124.20	
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509.123.20	553.122.20	599.124.20	423.124.20	698.124.20	
510.124.20	554.122.20	600.124.20	424.124.20	699.124.20	
511.124.20	555.122.20	601.124.20	425.124.20	700.124.20	
512.123.20	556.122.20	602.124.20	426.124.20	701.124.20	
513.126.20	557.122.20	603.124.20	427.124.20	702.124.20	
514.124.20	558.122.20	604.124.20	428.124.20	703.124.20	
515.123.20	559.122.20	605.124.20	429.124.20	704.124.20	
516.119.25	560.124.20	606.124.20	430.124.20	705.124.20	
517.121.20	561.124.20	607.124.20	431.124.20	706.124.20	
518.123.20	562.124.20	608.124.20	432.124.20	707.124.20	
519.121.30	563.124.20	609.124.20	433.124.20	708.124.20	
520.120.20	564.124.20	610.124.20	434.124.20	709.124.20	
521.121.30	565.124.20	611.124.20	435.124.20	710.124.20	
522.123.20	566.124.20	612.124.20	436.124.20	711.124.20	
523.120.20	567.124.20	613.124.20	437.124.20	712.124.20	
524.123.20	568.124.20	614.124.20	438.124.20	713.124.20	
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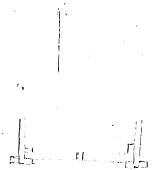
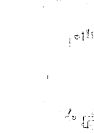
526.116.30	570.124.20	616.124.20	440.124.20	715.124.20	
527.123.20	571.124.20	617.124.20	441.124.20	716.124.20	
528.123.20	572.124.20	618.124.20	442.124.20	717.124.20	
529.124.20	573.124.20	619.124.20	443.124.20	718.124.20	
530.124.20	574.124.20	620.124.20	444.124.20	719.124.20	
531.123.20	575.124.20	621.124.20	445.124.20	720.124.20	
532.123.20	576.124.20	622.124.20	446.124.20	721.124.20	
533.123.20	577.124.20	623.124.20	447.124.20	722.124.20	
534.124.20	578.124.20	624.124.20	448.124.20	723.124.20	
535.124.20	579.124.20	625.124.20	449.124.20	724.124.20	
Oct. 15, 1894	580.124.20	626.124.20	450.124.20	725.124.20	
536.120.20	581.124.20	627.124.20	451.124.20	726.124.20	
537.120.20	582.124.20	628.124.20	452.124.20	727.124.20	
538.120.20

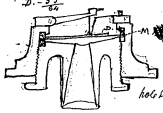




Inspection of Recorders # 13. 14. 16. 18. 19. 20
on Time 20th 1895

No 13 Diaph. straight styrene, pin-hinged
damper spring 7/16 by Draper, gives $\frac{53}{64}$
and small gold-beaters skin. .001

Dim of R. - 1"
D. - $\frac{53}{64}$



[illegible] is clothing
and nothing to [illegible]

Chas. Wright

No 14 Diaphr. glass .004 - 1 1/16
narrow .020 gossiclett cushions
straight hinged styrene lever
small damper-spring 3/8 hole in cap 5/16"

Records clear and sharp, metallic
not very loud.

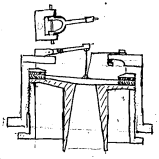
First record on 400th thread machine
was taken with this recorder
April 24th 1895 by
Chas. Wright

Piano played by
Miss Katherine Morgan

15. Diaphragm glass regular size 1.333. wide cushion rings of .020 gross. bottom .200 wide brass flange on both sides. Straight stylus lever with thin spring-fulcrum

Record not loud enough.

16.



Diaphragm glass. .0035, wide gossamer flanges .020 thick. .175 wide. Brass flange same width at the bottom. Straight, hinged stylus lever, small damperspr.

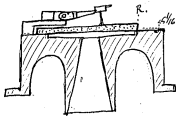
Records clear, very sensitive, but sharp metallic sound. no cuttering, no explosions

No 17. Same as # 15.

Except that the cushions and cushion-flanges are 1/16" wider.

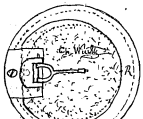
N. J.

No 18. Same as # 16



A Membrane of .001. double goldbeaters-skin is glued to the edge 1/16" wide of the holder. On top of the membrane is glued a diaphragm of cork 1/16 thick and 1.168 diam.

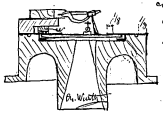
The diam. of the recess in the holder is 1.050". At R the edge of the cork diaphr and of the recess meet.



Straight, hinged stylus lever.

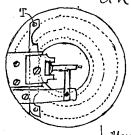
Very sensitive but a little rattling at certain notes.

19. June 19th 1895.



Diaphragm of thin gossamer-cloth 0.007. shellacked on cloth-side. glued on edge of holder 1/8 wide with rubber-silk down. and on glass-diaphr. 0.010. 1/16" also 1/8" wide. Torsion-spring fastened on top of rubber cloth and pressed down with brass-wedge. Dampersprng pulling on glass-diaphr. 1/8" behind Stylus-post. Sound-hole 1/16" filed oval towards stylus.

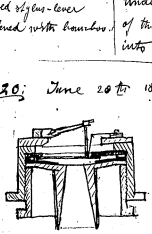
O.K.



curved stylus-lever stiffened with bamboo.

Under glass diaphr. a cushion ring of thick gossamer-cloth is glued down into the recess of the holder.

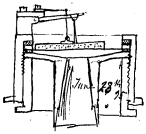
20. June 20th 1895. Altered # 15.



Membrane of thick gossamer 0.020. Diaphragm Aluminium 0.013 thick, hard rolled 1/16" diam. straight stylus-lever with spring-fulcrum. Damper-spring pulling on stylus-post. Damper-cloth glued on round-hole

O.K. (not very loud)

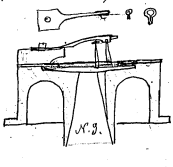
21. Changed # 10 200 Ths. Recorder



Diaphragm of gold-beater skin and cork. Damper-spring pulling on cork disk 1/8 behind Stylus-post.

If spring-tension too hard it is not sensitif enough if tension is loose, it rattles n. g.

22. June 29th 1895



Membrane of white Rubber-hospital-cloth shellacked on cloth-side. Diaphr. aluminium 0.013 thick 1/16 diam. Stylus-lever bent of steel 0.008 thick. Damperspring pretend the same way as # 19.

July 2.nd 1895. Removed dampersprng. on # 22. = louder & clearer

July 10. Put on a dampersprng of # 10 needle. O.K. not very loud.

July 3rd 1895.

Changed # 21. (210/10/10)

Diaphragm Aluminum 0.012 x 1/16
Membrane Goss. cloth 0.007. shellacked.
damper-spring 1/8' behind stylus-post.
good but not very loud

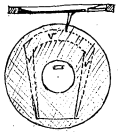
July 11th Put new membrane of double gold-beater-skin into Rec # XIII. (.010) glued after whole face of glass-disk and shellacked on both sides. O.K.
damperspring on stylus-post

July 11th Rec. # XIV (.010)

Glued a membrane of ~~sk~~ varnished tracing-cloth on the edge of the cap and glass-disk on outside
Damperspring on stylus-post

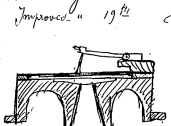
July 12. Rec # 10. 200/.010.)
Improved the same way as # 13 with varnished tracing cloth but stretched on separate ring and glass diaphragm on the inside of membrane (towards the cap.) sound-hole in cap ovalized. O.K.

July 13-15 Rec. # XX (0.010)



Tongue - disk of hard aluminum glued on membrane of varnished tracing-cloth.
v. vibrating space
no damperspring.
Not very loud

Made July. 16. and Improved " 19th Rec # 18. (0.010)



Fixed the same way as # 20. but the tongue is parallel instead of taper as in # 20. Vibrating space 0/32 not loud.
Vibrating space increased to 1/32 July 19th Very sensitive!

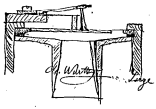
July 18th. Rec # 16 (200/.010) improved the same as # 20. Tongue of rosewood 1/8 thick membrane varnished tracing cloth. damperspring 3/8 behind stylus lever. not sensitive enough
Vib. space 0 — 1/8. Tongue on the outside

July 22 Da 1895

Improved # 16 200/010

Put wood-tongue inside

Damper block of cork pressed down by damperspring behind the stylus-post — very clear.



Edge Elongated hole in Diaph. cap

O.K.

Aug. 7th 1895. Rec. # XXIII. 400/2010.

Tongue Diaphragme of medium (2010) gossamer cloth and white-wood, stretched on ring inside. Tongue 0.027 thick Membrane .0005. Tongue on inside.

O.K.

Aug. 8th Tongue Diaphragme put into Automatic Reproducer 2010. Membrane varnished tracing-cloth — tongue 2010 white-wood tongue on the inside.

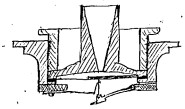
O.K.

Least scratch 1.) # 18 on Cigarette wax without
2.) " 20 Carcasse (for Dupl. originals)
next scratch 3.) " 19 Oct. 14th 1895
XIII. 3. XXIII.

Oct. 16th 1895.

Improved Receiver # 14. 200/010 400

Hole in diaph. cap 0.140"

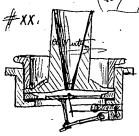


Diaph. 1 1/16" tracing-linen shellac'd on both sides (French varnish) glass diaph. 1 1/16" diam. .005 thick. on the inside of membrane membrane fastened to the rim of the diaph.-cap with shellac.

Clear & natural but not very loud

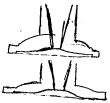
Damperspring attached to stylus post.

Oct 23 Improved Rec. # 20 with stylus-arm of # 18.



(200/400) hole in Diaph.-cap. 5/32"
membrane of gossamer cloth & tongue of white wood on inside
damperspring close behind stylus-post — thick rubber cushion under, on top of diaph. organe-ring
not loud, otherwise O.K.

Oct. 24th 95

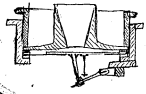


Diaphragm opens with small hole
no improvement

Oct. 30th 1895

Improved Rec. # 21

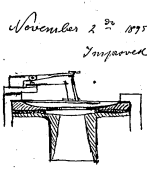
Sylvester # 16. Diaphragm same as # 10 (20/20) Membrane of Tracing-cloth varnished on both sides with French Lacker. Excentric Diaphr. of glass 1050 Diam. .007 thick fastened on inside with liquid Bellcoll (fresh dissolved gutta) clamp-joining 1/2 behind stem-post 1/4" hole in Diaphr.-cap.



Very cond!

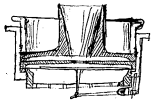
November 2nd 1895.

Improved Recorder # 20.



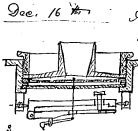
Cup-shaped Diaphr. Disc with hole in center 3/4" Diam Regular cap (flat) with cushion of thick gross cloth with hole 3/4". Membrane of Tracing-cloth Bellcoll on both sides Very sensitive. Glass diaphr. .009 x 1050 fastened on inside

Dec. 16th 1895.



Changed Rec. # 10 (20/20) for 320/10/. Membrane of Bellcoll Tracing cloth Diaphr. of Aluminum .0012 thick. Double air chamber above Diaphragm Tightening ring below to stretch membrane Very muffled and rumbling. N.G.

Dec. 16th



Air-cushion for automatic repeaters for 400 and 320 Threads Lower bottom of Tulip-wood .075 thick, hole in center .038. Diaphr. Wood tongue on Tracing cl. Bearing between Diaphr and Damper bottom. N.G.

Dec. 17 Removed Damper bottom and Exchanged Tong Diaphr. by Excentric-Aluminum Disc-Diaphr Membrane thick Goldbeater cloth. Loud but muffled and rumbling N.G.

Dec. 18th

Removed Alum.-Cloth. Diaphr. and put in Solid-wood Diaphr. N.G. rattling.

Dec. 26th Tongue-diaphr. of Aluminum and Tracing-cloth French varnished on one side, Bellcoll on the other. O.K.

Replaced Wood-Tongue Diaphr. by Cloth-post & Alum.-Cloth.

Dec. 23 Do. 15. Dec. 23rd 97

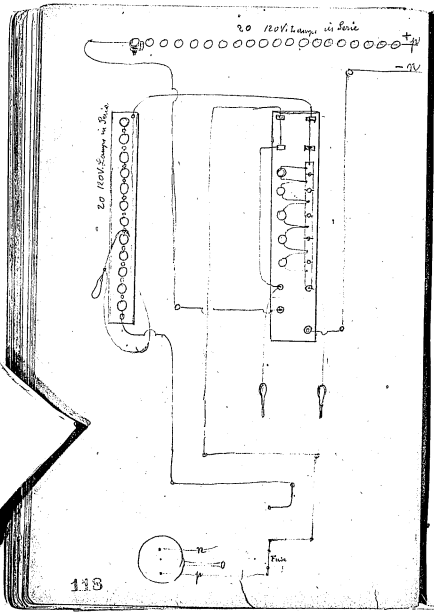
Recorder # 10. Diapha. mod. Jess. cloth and Tulip-wood. ng. not bond.

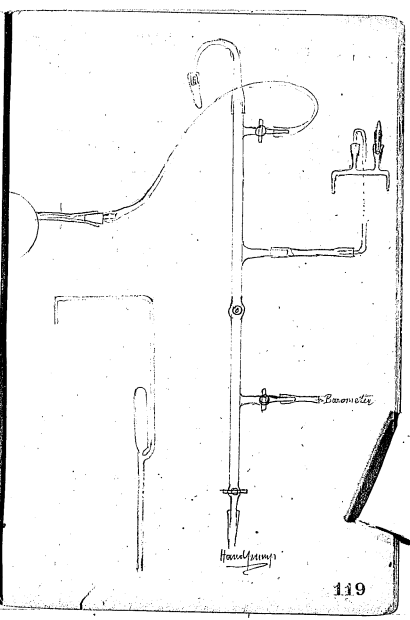
Dec. 23rd Rec. # 10. Diapha. Tracing-cloth French Varn. on one side and shellac on other. Diapha. Alum. disc. (.002) flattened same as above C.K.

Dec. 24th Rec. # 10. Mod. Jessamer cloth. Alum. disc. .010 x 1/8. Stretched loose. good but a little muffled.

Dec. 27th Rec. # 10. Thicker Jess cloth; French Varnished on cloth side. Alum. disk .010 x 1" stretched on above cup-ring. fastened in rubber-side not fr. varnish.

January 27. 96


20 120V. Lampen in Serie
+ p
− N
20 120V. Lampen in Serie
n
p
Fuse


Barometer
Handpumpe

May and June 1896

Made small mercury pumps and fixtures for plating large - 15x Cylinders in Room 5
Also Mould for 2. cylinders.

July 10 th Cyl # 1. finish plating
after 2 days only 1/2 night.
Started with 22 lamps - 100 breaks p. sec.
finishing with 6 " good bronze colored deposit.
Gold on belt comes of with Ammonia in a coherent film. Used very little cosmetic for belt.

July 21 Cyl # 2. finished after 1½ days
dark red deposit. Deposit in belt very faint, washes of with ammonia in exceedingly fine powder, comes of hard. Used very much cosmetic for belt.
Started with 10 lamps finished with 6.
Used old ½" gold-strip for 1 & 2.

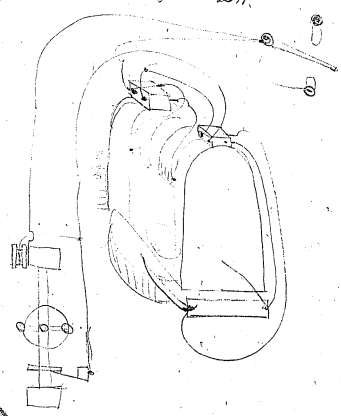
August 4 th. Cyl # 3.
finished after 14 hours in Vacuum.
Used beeswax for belt packing.
2 strips of new gold 0.001 and fine strip on both edges. Started with 10 lamps 155 Cr. reduced to 8. 6. 5. 4. up again to 12 and finished with 10. Changed polarity now and then. Used the narrow strip as anode left the end of 10 inch (in vac) the cyl is nice yellow on strip and bottom as 3/4 in the rest is purple. Towards the 12 hours a beautiful metalic gold deposit is appearing all along. 9 lamps for the last hour
It seems to be the best way to use 10 lamps 150 breaks the narrow anode and no changes of polarity. 5 minutes exposure and 10 to 15 min rest. or 3 min. exp. and 10 m. rest. according to vacuum.

In the copper-bath, the plating stops at a deep scratch at the lower end but recommences later on to within ¼" from the lower end. The gold-strips have to be ½" longer on each end.

Aug. 12th to 22nd Vacation

Aug. 24. Started on Taking-machine for large Lime Cylinders 240-280-300

L. 6 3/8" × 2.750 D.



Octob. 1st 1896

First experiment with Trialos [illegible] machine (without inlet) 5 3/8 × 2.750.

November 10th & 11th

2 Records taken with Piano & Clarinet (Nov. 11)
In Duplicating purposes min Records # 20 (imp.)

Nov. 19th Doré Cyl. (Piano) avec la pompe à vacuum à main. Vac 24 – 1 cte. 12 Lampes (à 16) après 2 fois la dorure est bonne, un peu chronohistre. Tirés Nov. 21. à 9 h.

Nov. 23-28. Installé la pompe avec moteur électrique; 30 coups par min. L'Aimant fait 40 Rev. par min.
Etamé le moule de Cyl. de 3" ——

Nov. 30. 3.30 S. Commencé à dorer Cyl. 5 (Clarinet & Piano) Après 20 min le Vacuum descend à 1 cm (25 coup p. min.). 13 Lampes. à 6 heures la dorure est assez prononcée, un peu rongeante. Les 2 extrémités ne sont pas so bien couvert comme le reste. Un anneau de cuivre bronzé, mis sur le cyl. ne sert à rien. La cloche a été sellé avec de la cometique et de

la cire; et nous commençons le courant à 8 heures 15 min. avec 5 à 10 mil. d'int.
Après 20 à 25 min. la dorure a commencé à se montrer tout le long (grisâtre).
Pour produire une couleur d'or naturelle j'ai continué l'opération une journée et demi environ. Vers midi du 1er Déc. la couleur était la même comme cyl. # 4, et bien uniforme tout le long; pas de trace de bleu aux angles. Dans l'après-midi les angles commencent à devenir bleu; mais la couleur du cyl. est un magnifique or naturel. Pour la nuit j'ai laissé entrer un peu d'air dans la cloche et continué l'opération Déc 2nd jusqu'à midi. Le bleu a entièrement disparu, seulement dans 1 heure; on bas dans 2 heures et vers midi les angles extrêmes ont tourné un peu vert; le dessus rouge-pourpre, en bas une bande de 5 m/m au dessus de l'angle est brun-pourpre.
La couleur du cyl. entier est jaune, un peu verdâtre. A 10 h 20 ouvre un peu d'air entre la cloche.

Il me semble maintenant de suivre les règles suivantes

1) Laisser la cloche seulement avec de la cire jaune.
2) Lancer le courant seulement quand le thermom. a descendu à 1 deg. ou moins.
3) Ne jamais arrêter la pompe. Commencer avec 30 amp. pas min et descendre à 25 vers la fin.
4) Pendant la première heure continuer le courant pour 15 min avec 10 min d'intervalle. Après la 1re 7 minutes et 7 min d'intervalles.
5. Commencer avec 14 lampes et 12 après la première heure.
6. Laisser entrer de l'air dans la cloche pendant la nuit ou quand les angles tournent bleu.
7. Nombre de revolutions de la roue à interrupt. de l'indicateur 600 p. m. - 120 interrup. par seconde
= 2 lampes parallèl.

(9.10 AM)

Decembre 4th. Mis dans le bain de cuivre le cyl # 5. La resistance est ajoutée a 2 1/2 amp. avec un cyl. provisoire. Temperature de la boîte et de la liqueur 46° F.
Le cyl a été dans la boîte pendant la nuit. Aussitôt après l'immersion le thermometre indique 1 Amp. et monte doucement à 2,2 au bout de 2 ou 3 min.

Quand j'ai inspecté a cyl. au cours de 40 min. il était bien convexe, tout le long. La tige, avec cet règle de manière que l'impression indique toujours 2 Amps. Il m'a semblé que le courant était un peu trop forte.
Densité du liquide 1125 at 60°. Ajouté un peu de liquide de 1140, et une cuillère à thé de Poj. C.P.

Janvier 4 - 97

Trouvé 6 blanc 10 mm plus long et 4 mm plus large en diam. L'eau dans la chaudière à 165 et dans le bain 100°. Durée de l'immersion 115 minutes. L'eau dans le Noyau central a 110 au commencement et monte à 123 - 125 et redescend à 125. Le moule, n'ayant pas de manteau ne resiste pas la pression et se fend.

Janvier 30. Copie # 2. (moule II)
Cyl. de cire blanche, ne retrécie pas autant que la cire brune. Le moule a 6.25 tourpé et fini sur ce cylindre

Feb. 4th 1897 p.10 Copie # 3 (de moule II)

Chaudière	Boîte.	Noyau	
95	100	—	(65°) cyl. 4 mm.
135	102	100	plus long et
140	107	117	2 mm plus large
	107	123	que moule

Le gros bout du cyl. est 1/8 du bout de l'arbre du Noyau. L'écrou du noyau est 1/4" du ~~dehors~~ Couvercle du moule. (6339 x 56) 2779 (87).
Le cylindre monte sur le noyau et presse si fort contre l'écrou qu'il n'y a presque pas moyen de le desserrer. La cire tout ensuite a un mollice allong du noyau. Lond & Scratchby

Copie # 4. (moule II.)
Le gros bout du cyl. est 1/32 du bout de l'arbre. L'écrou n'est pas mis sur le noyau. Le cyl. est 6 mm plus long et 2 mm plus large que le moule (à 65°)

	Chaudière	Boîte	Noyau	
2.12.	125	70.	105	40 min.
2.50	123	100	120	

Clear & little scratch

Longueur de la copie 6341 de 52 à LXVII Aegol
Diamètre Aegol pour 5 2780 de 97

Copie # 5. of 75°. Le cyl. est 3m plus long et 2m pl. large. est 1/8 de la rad. de l'arbre. L'écrou est mis sur le noyau à 1/8 du couvercle.

Feb. 4. 1897. 5 – 6 P.M.

	Boîte	Noyau	Chambière
5.	90	110	120
5.10	105	110	128
5.30	115	120	128
5.35	112	120	

do 20 [illegible]

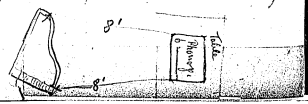
Raccourcissement deux millièmes, par dix degrés.

Feb. 5th to 11.

Records No. 3 to 8. Experiments with Bamboo-crossbar on Recorder instead of Tension spring

March 17.

Good position for Piano to 6° Phonogr.



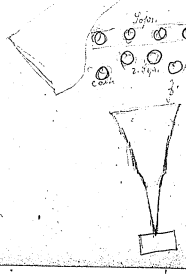
April 2nd 1897

Meilleur Tracens pour la langue 1.) 14, 2.) 30. 3.) 23.) 4.) 10.

Apr. 6. & 8.

Meilleur Tr. pour chant de chœur 30
" " piano, joué par un homme 23.

Position des Chanterelles et du piano le 6 Avril.



April. 9th. 1897

Commencé à deux Gr. # 10. Cire jaune. Piano.
Le tuyau est humide. Il faut [illegible] la sonde.
Le vacuum ne remonte pas la première fois
Il est important de remplacer la cire
autour des tuyaux de l'appareil à vacuum
et de mettre assez de paraffine
sur le bord de la cloche.

Recommencé à pomper à 4h.40 et au bout de
10 min le vacuum est à 6.
Commencé avec 12 lampes. et
après 12 min. en plus le vacuum est à 7
Le cylindre montre de larges plus jaunes
continué à pomper pour 7 min. (Vac à 7 1/2)
fermé le courant avec 10 lampes
et continué à pomper pour 10 min Vac 7 1/2
à 5.15 l'or commence à paraître
en nuages foncés. à 5.35 le Gr. est
vert laitue. à 5.40 le Vac est 7 1/4
arrêté le courant pour 5 min. (5.40 à 45).
La fluorescence est bleu au pôle + et
presque violacée au — (c) Les lames +
sont à peine rouge. La cloche est
peu chaude (3 lampes au moins de

Carmant. La pompe fait 27 coups p. m.
avec 3 16 c. lampes et une municipale.
A 6 h. le vert tourne en or métallique.
Arrêté à 6 h.

Recommencé à 8h25 m. avec 13 lampes.
à 8.55 le vac est à 1,2 après 55 min avec courant
mais le cyl. n'a pas gagné que très peu d'or.
5 min d'arrêt. Cour. courant 10 m. de passage
avec 10 lampes à 9.30 le vac. est 0,9
Arrêté la pompe pour 5 min. pendant le
passage du courant et le vacuum monte
à 1 h.

———

Cire vert.

May 7 th. Gr. # 21 (Piano Klein)
Doré au 7 th 10-8 Lampes (Vac. 1-3/4)

Laissé dans le bain fixatif (45) 8 jours et
9 mints. Commencé avec 1,7 Amp. fini
avec 2,2. —

———

May 18- 19,20 Fixé 2 copies 21 1,2 3.
Ac 3. Tourné 2 m plus long et 8 m plus long
que le moulin et 5 m conique (1 et 2
sont 8 m conique et 1/2 m plus large.
Temperature 75°

Temp. dans la boîte 110 à 122
" " le noyau 115 à 128
exposé pendant une heure en tout.

L'eau chaude est tirée de la chaudière avec un tuyau de caoutchouc ca. 15" plan haut.

May 20 # 4 (21) Cire jaune
Chauffé à 132 et 122, 1 heure
[illegible]

May 21. # 5. Cire ouvrée (ancien maître.)

Bâtonnet 7 [illegible] et 1 [illegible] plus gros que moulé
Chauffé la boîte à 120 avant de mettre le moule. L'eau dans la chaudière à 115

May 23 Le Sept. 1 [illegible] 1897.

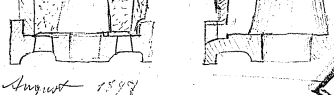
Expérimenté avec différentes manières à fondre les cylindres et filtrer la cire.

1/ Moule avec fond perforé et axe rotatif avec soupape d'aluminium

a. Plongé le moule dans la grande marmite en Pb. Wks. à 321°.

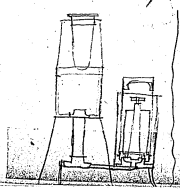
b. Versé la cire filtré à 380° dans une boîte de fer-blanc et plongé le moule là-dedans.

c/ Le fond du moule est ouvert sur le coté et la partie cylindrique du moule est ~~[illegible]~~ soudée 3/16" pour laisser entrer la cire et baissé pour le fermer.



3/ August 1897

Préparé le mécanisme pour filtrer la cire dans la marmite d'Alum. qui est muni d'un tuyau avec robinet pour laisser couler la cire par en dessous dans le moule.



August 28 [illegible] 1897

Put Rec. Stylus of axis into Recordings 15 x 20
Rep. Cal of axis " Reproducers
No more coke but more Soratch

Septembre 7. to 11. 1897.

Doré les cyl. # 2. 18. 19.

2 vieille cire sans essence!

Dorure belle métallique un peu rougeâtre.

L'anode s'est rapproché du cyl. pendant l'opération jusqu'à 1/16"

18. Cire ordinaire des Phonogr. Wks.

monté en plongeant.

Dorure très rouge.

19. Cire mélangé, moitié vieille sans ess.

moitié nouvelle ordinaire avec 7% de

filé dans petite marmite d'agat

réchauffé et monté en plongeant (1.) 6.)

Dorure jaune magnifique. 2 suffisaves.

1

Sept. 24. Moule # 5.

	Chaudière	Boîte	Moyenne
Cyl. # 1 4.30.	115	100.	10.2
5.	132	120	127
5.30	127	127	129
5.35		114	127 +)

doré en temps de presse.

+) Temperature extérieur du cylindre

L'eau arrêté et les lampes éteintes.

Gratte terriblement. mots entiers

Cyl. # 2. (Tres ... ou côté Zinné

au Four seulement 2me fois chargés.)

9.48.	115	87.	110.
10.10	122	112	124
10.30	124	107	121 ½
10.38	124	106 (lampes)	122

éteint les lampes avant de commencer

et retiré après 12 min. seulement dans

Pas assez pressé.

Sept. 29. 1898. V.

Rincé le même dans alcool de 110° ~~C~~ et un dans l'eau. Sp. pas passé à 80°.

	Pouls	Bras	Moyen
10h.	~~138~~ 136	100.	112
10h 30.	138	104.	125
11.30	130	102	115

Trop [illegible].

Sept. 25. 98. # 4. V.

[illegible]

[illegible] une fois alcool froid (Ranf.)

Tourné à gauche 3m 9h 8m pas dog à [illegible] respiré pendant la nuit.

			Sleep après
9. 45.	120	90.	110
10.15.	après l'Oeuf (fin)		114
10.55	127	92.	116

Rafraîchi du même du bout d'une heure

Trop peu tout à fait assez, Gratte

Louis [illegible]

5 V.

à 6h 3m. 10m.

2.25.	114.	75	105.
3.	115	80.	112.

3h après l'Oeuf

3.25	117	80	113

Le cordée a été rincée avec du Naph. deux eaux. Le vin et de l'eau coulante

6. V. Sept. 29. 1897

à 12. 5m et 10m. Rincé avec Naph. Chloroform au Bain froid 22 lo 1 Alcool C et Eau coulante

9.55.	90.	70.	70.
10.30.	106	80	102 après l'Oe.
10.50	100	90	105 ½

Sept. 30. # 7 V.

à 7h 8. 5m et 8m. Rincé avec Naph. Chloro. 2 Alcool et Eau coulante.

9.	88.	72.	
10.	104	90	101 ½

Levé l'Oeuf à 9.25 (102)

Sept 30. 97. III 4. 5h 13m 72°

Rinsé dans Napht. Chaud 24h. et Eau froide.

2h10	100	82	?	Lait Véron
320	111	82	108	au commencement

Le moule n'est pas enfumé, il est percé en plein air à 82°. Lait mis dans le Lamp. de 105 à 108 et enlevé avec Liq.

Sept 30 V. 8. Eau glacée 44°

Rincé dans Naphta + Ether et Eau froide

3h	109	83.	?
4 20	113	83	110

Oct. 1. 1897

et V. 9 9m 33s

Rincé avec éther froid. — Rapriché le lait à un peu avec de la glace à 74°. La chaleur dans le moule monte dans seulement à 115°. Lait 3/4 h. Rapriché dans glace et sel à zero.

Oct. 4. V. 10

Formé Cyl. 10m D. and 13m L. Orga Fers moulés. cooled to zero for trois heures. chauffé doucement à cent-cinque pendant 1 heure et vingt-min. et mouvé à Zero.

V. 11

Oct. 7. Cyl. formé 9m et 24m pl. à 70°

Rapriché pendant la nuit dans glace et sel; entre tout juste dans le moule.

8.50.	78.	68.	
10 —	120	68	115

Rapriché dans de l'eau glacée 33° cassé. Se fend en 3, 2 heures après de sortir du moule. Retiré du moule dans la grande bath à

791
96 Oct. 7. III 5 774.800.158.-65

Vinée 6 mois dans Bouteille, [illegible] de cire 3.7 eau contenant. Cyl. 45 cm² 22 cm pl. d'à 65 mettre cyl avec Cl₂ et Vin, et Eau ammoniacale respectivement (à 20°; 1 h)

		(Begin)		
3.—	114.	101		
4.30.	120.	72	115	retiré dans [illegible]

pas bon. [illegible]

Oct. 8. V 12. 62° 801.5 - 774.5. 344.

1.50.	86.	70-100.	—
2.30.	105	110	101
3.—	120	109	125
3.25	130	114	

1.) Resp. dans glace et cyl à zero 2 h. [illegible]
Cyl. 5 h et 20 pl. gr. à 63°.

2.) Resp. dans Eau glacée et Salée 32°.

Des rubans de cire minces sont forcés entre les concavités et le noyeau 10 mm de largeur.
C'est sur des bleues cyl. pitché et réchauffé à 114° cire de 5 ans et nouvelle. (# 13)

Oct. 19.-21.

[illegible] Cyl. # 29 cire de 5 ans, 28 cire vieille [illegible]
et # 26 cire [illegible]

Commencé # 29 à 5 h. soir et resté à 9 h. le lendemain matin, par cycle j'a une baisse d'environ 1½° qui a l'air de gresser.
Commencé # 18 cire vieille à 10.35 (13 janvier 3 [illegible])
Il toujours rouge-cuivre. Les anneaux bleu nouvelle l'air dans la chaudre 2 fois.
Sorti à 9 h. 15 le lendemain, tout rouge. Les mis dans l'armoire à glace à 5.30 du soir et laissé là pendant la nuit.
mis dans le bain le 21. à 9 h. m.
L'ammoniac ne monte pas sous la cloche, mais reste à 0,1-0,2 à peu près ½ minute, monte à 1, retourne à 0,2. et remonte assez rapidement à 1,8 et bientôt à 2 (il a été ajusté à 2 avec le cyl. provisoire)

Oct. 25. 1897

[illegible]

143

Dec. 23. 1897

		Record		Time	
Arnold # 4	Cor. 125	[illegible]	125	30 min.	
[illegible]	126	130	125	25 min.	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
D 4	125	125	112	25	
[illegible] B.	123	125	90-12	22	"
" B. [illegible]	112		112	18	"
" [illegible]	123-3		112	18	"
" B. " 8X12			112	18	"

May 23 2d 1899

[illegible] 111 B.

May 23 2d 1899.

Revised Concert-record # 1A & R

May 24th 99. [illegible] 2. & R

June 9th # 1A & R. See Day Book last page

Cor. 126 B. 132 Time 120 114 65 min.

Not very good Number Book!

1 m. Carries at 70

Cinn. [illegible] Game 1 m. [illegible]

143

June [illegible] 1879

[illegible] 2 (114) [illegible]

[illegible] 135 [illegible] 1 [illegible] T'100 [illegible] 25

No 9.

[illegible] 24 [illegible] 94.

[illegible] 14(5)

B. 127. C 120-[illegible] 25

[illegible]

[illegible] Exhausted [illegible]

Sept 4 1879

Experiment with Washing of Cotton

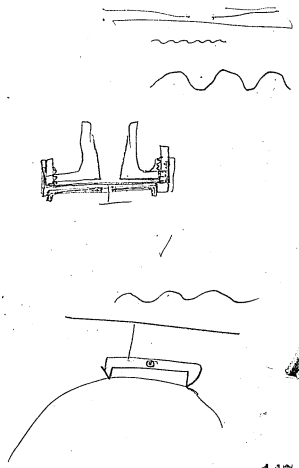
See Dup. Book IV

No. 111 White blanks of 50% and 60%

of felspar - parts with regular Wax

Phenomena hard and rough

Take the same as before



33 [illegible] March 1902.

Experiments plating on glass, with finish metals in vacuum.

March 22. Plated piece of glass 1/2 with silver 1/2 with Cadmium, overlapping the two metals in center of glass 1/2 in. Silver plated evenly without turning black at edge. Plated rapidly. Cadmium in very [illegible] deposition taking about one hour & a half to deposit a [illegible] This transparent skin melted very high voltage. At one time in [illegible] the cadmium [illegible] is bright black where the cadmium anode was fastened to the platinum conductor and instantly the glass & vacuum pump came rooted in a few minutes before.

March 26. Plated glass with silver. Obtained a good heavy coating but of a yellowish color, probably because the support for the glass was hastily made first time.

March 27 Plated glass with silver. Had nothing [illegible] but glass & two steel clamps in vacuum pump. Heavy even deposit in 1 1/2 hrs. Edges did not turn black. Silver on center of glass turned a little dull. Coated only 1/2 of the surface of the glass.

March 27 3:30 P.M. Started to plate other half of same glass with zinc overlapping 1/2 in. over silver at center. Had to use [illegible] very high voltage until zinc started to deposit. Deposit started to show about 1 hour after current was turned on. After plating for about 2 hours with the high voltage had to reduce voltage to same strength

takes to plate gold & silver. Can do vacuum jar get quite hot without discoloring deposit. Finished plating at 8 next morning. Mch. 30 - Started in about 1 hour Results: Got a beautiful even deposit over entire surface without discoloring at edges. Anodes were 1/8" wide and about .002" thick. Used glass cathode, mounted on glass support, half way between anodes.

Mch. 28. Plating mirror with bismuth & silver. At 5:30 started to plate 1/2 the surface of glass with silver. Current was a little too strong & anodes too narrow and were only 1/8" wide. Started with 10 lamps and in about two minutes increased to 9 lamps. Deposited more freely & also spread more over surface. Left on plating with nine lamps until narrow anode or electrode limited. Deposit good but not heavy at edges. Should have had both electrodes 1/8" wide strip of bismuth.

Mch. 29. Peeled other half of same glass with silver. Finished Monday morning. Good bright coating. In the afternoon same day Mch. 29 started to plate another piece of glass with silver over half the surface. Used new vacuum jar & also used rotator to support glass. Metal on rotator did not

seem to affect the plating. Finished plating Monday morning Mch. 30. Good bright coating all over.

Mch. 31 - Afternoon. Started to plate other half of glass with bismuth overlapping 1/2" over silver. Started with 9 lamps & 7 buttons on rheostat. In about 3 minutes the vacuum jar became so heavily coated that I could not see through it. Glass had a very heavy even deposit of a smokey grey color. Deposit so heavy that should not see through glass by holding it up to light.

Coated the different glasses with Otto negative varnish & with white shellac. Negative varnish is good for covering silver, copper, bismuth, but no good on zinc peeling & shriveling the zinc as soon as it is applied. Shellac varnish is no good giving the surface a nasty dirty color. Negative varnish Otto good for coating cadmium.

Plated a good wax record with cadmium actual time taken to coat record, with a heavy deposit, about 5 to 8 minutes. Total time, allowing for rheostat & cooling about 30 minutes. Deposit on record was of a beautiful silver gray color evenly distributed over entire surface. Electrodes about 1/8 in. wide & very thin. Used same amount of current as for coating glass. Put record in coppering bath at 6:30 P.M. Had to use 2 1/2 to 3 amperes

too wet as cadmium has more resistance than gold or silver. Started to cover very slowly but next morning Apr. 1 record was covered all over. Took out of bath Apr. 2, 12 o'clock noon and all finished to 2:30 P.M. Apr. 2, 1902.

Apr. 2. Plated glass with Gine - O.K.

Apr. 3 Plated on same glass with silver

Apr. 1-02. Record made on chalk coated with oxide of zinc. Plated with gold. Gold deposited quite freely but the surface of the record was of a grayish color

May 31/02 Plated record, made on Mars "Marvine Soap", with gold. Deposited very freely. Obtaining a bright heavy coat of gold in 5 hours. Good Vacuum

Sept. 3, 1902 Plated white silk lace. Placed lace in a glass cylinder in a small vacuum jar. Plated on one side with a thin coat of gold. Time 5 hours.

Sept. 4-5. Black silk lace. Plated same way as above but plated on both sides, taking lace out of vacuum jar and turning it over after one side was plated

Sept. 8. White silk lace. Plated same way as above but using one gold & one silver anode in vacuum jar. Plated on one side. Color a little lighter than with gold alone, time 5 hours.

Sept. 10. Black silk lace. Plated on one side, first with a heavy coat of silver and then with a thin coat of gold. Nuit.

Sept. 3, 1902 Plated two nickel discs with a thin coat of platinum on one side. Fred B. Dally.

No. 3 Plated black cloth braid with gold. Placed two discs or rotators with glass cylinders on opposite sides in large vacuum jar, revolving the rotators both together by means of a magnet connecting the two rotators with a belt and pulley. On revolving the said passed back and forth in

November 16. 1902.

Experimented with Chocolate.

I. Poured molten Choc. into mould without a core and after setting a little, scooped out the centre-part; then put mould in freezer in icewater for 1½ hours. Came out nice and bright. Record fluff and sharp; but afterwards a fine moisture soon condensed on record and spoiled surface.

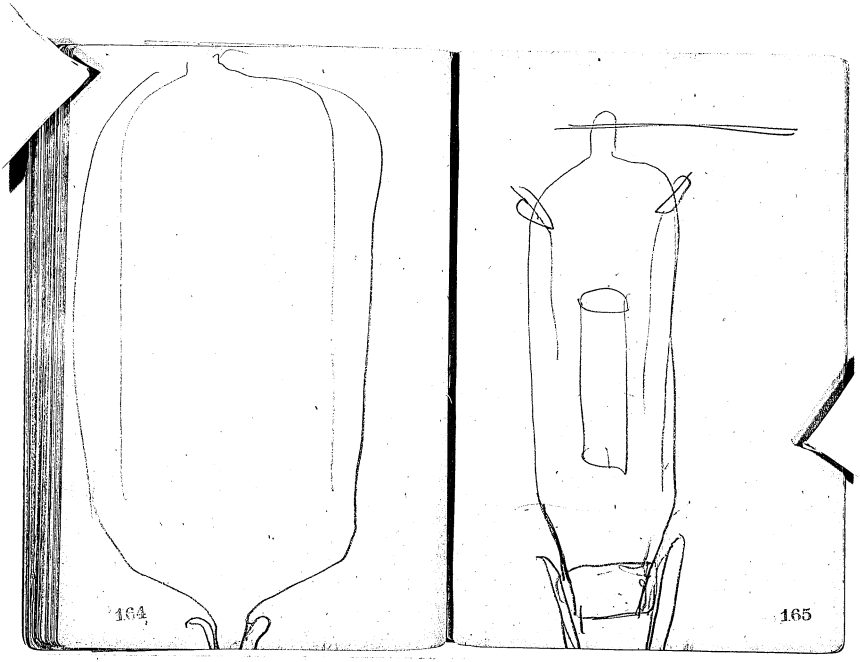
II. Put paper-shell on core and worked molten Choc. into mould with spoon and fingers. Could not make it to run full. Cooled in icebox ½ hour (50°) after withdrawing core from mould, put it into a dried icebox in cool room. No sweating. Those parts of record, where Choc. filled mould, were plain and sharp.

August 3, 1903. Plated phonographic record with gold continuously for 7 days, resetting the timer. At end of seven days could not get gold to deposit bright.

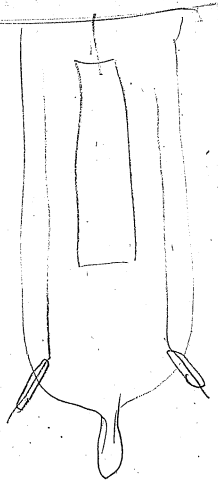
August 7, 1903. At Mr. Dyer's suggestion plated record with gold using the anode in another bath and which gold was found not deposit in a fine state even directly against the record in the same Bunsen battery.

August 8, 1903. Started to plate phonorecord with silver to see if silver mould will work better in the Neumann & Miller process of moulding. Gold does not hold long on account of the acid used in the perfection of the moulding and also on account of the intense heat used in moulding.

Aug. 20. Plated record in vacuum for ½ hr with gold then ~~nickel~~ nickel plated it for 35 min in bath using 1.3 to 1.5 volts ½ amp. After plating for 35 min transferred directly without washing nor drying to copper bath. After a few failures on account of nickel stripping and also refusing to adhere to copper succeeded to obtain good results, nickel adhering perfectly to copper.


164
165

Left



Nov. 19th 1895. 8 A.M. Nov. 21.

46 (long) very dull		
46 dull.	3	Very dull
52 not affected		
56 " "		
55 slightly affected		
60. Very slightly "		Very slightly dull
60 " " "		dull
61 Very dull	— —	Very dull
66. Very bright		
60. Slightly affected.		
57. Dull		Very dull
64 Very slightly affected.		

Nov. 21. 9 AM 1895 Nov. 27. 4 PM.

77. Not scratch — bright slightly
83 Slightly scratchy — considerably scratchy
80 Very slightly scratchy — bright
81 no scratch — bright
82 Slightly scratchy (considerably scratchy) — bright

On 82 after 24 hs exposure small red spot appeared which came off at the 17th showing. Taken out and exposed again Friday 10 AM

86 Exposed to practically temperature before timing off. Very faint scratch. Exposed Friday 22 10 AM

90 Very faint scratch Exposed Nov. 26. 4.
93. Very " " " " " 27 " 4 PM

[illegible] bright
[illegible] Bright dull. bright underneath
[illegible] Very dull dull " "
[illegible] dull bright
[illegible] bright
[illegible] Very dull dull
[illegible] " " dull. Very slightly [illegible]
[illegible] Very slightly scratch bright [illegible] dull [illegible]
[illegible] moderate very dull
[illegible] bright but considerably scratch
[illegible] " "
[illegible] " "
90 " "
91 — "
92 " "
[illegible] " "
[illegible] — "
[illegible] " "

#56 CM is the best of the nitrocellulose
The 13th of November. 1896 It is just as bright as new — no scratch, no dew — no fuzziness! —!—!
HW. #46 takes the best records, does not scratch but if not frequently used it gets a dull hazy surface.

Received Nov. 30th AM Turned off; previously
84 [illegible]
W.W. [illegible]
56 " "
60 No secretes
54 Lachrony
46 Little secretes
50 Mouth! Lachrony [illegible]

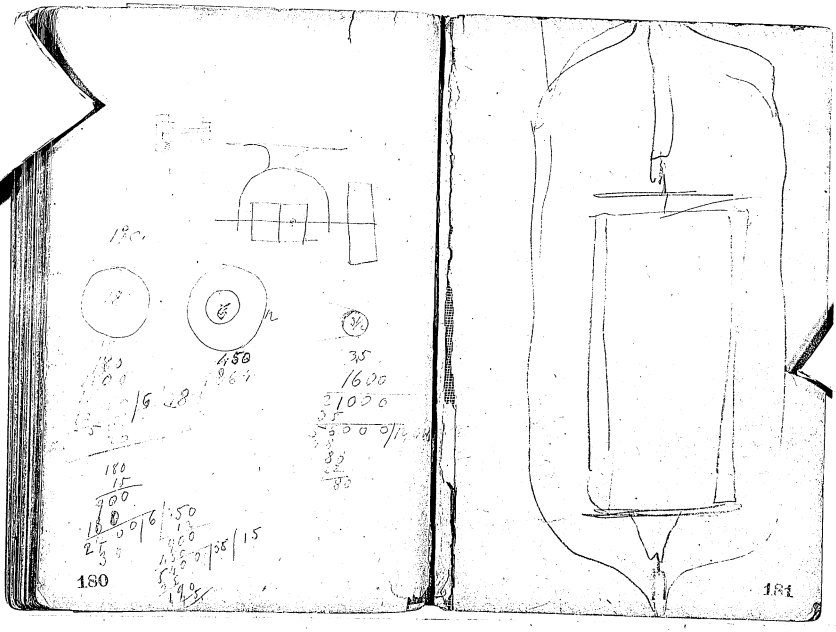
Box # 16 contains 5 Dupl. cast solid, pressed hydraul.
3 Dupl. filled with Paraffin, 4 shell Dupl.

4 Pressed Dupl of B. C E L P. S O V W U

2 Shells with and without cores

1 Faulty originals (new style)

3 Old Thresh (regular cylinders) 2. WM Dupl.



Notebook, N-91-12-05

This notebook covers the period December 1891-January 1892. It was used by an unidentified experimenter as a logbook for deliveries and test results of experimental lamps. The spine is labeled "127." The book contains 9 numbered pages. Several pages have been removed from the book.

Blank pages not filmed: 8-9.

(XE-172) N-91-12-05

Edison Special No 1 - 1/2/92 (1)

Lamps Made 12

Lamps sent To Test room 12

These lamps all run good on pumps. all even - no bad spots

(No 9 = 1892) 9 1-2-92

Lamps Made 12

Lamps sent to test room 9 = 0 crack in seal. these lamps gave off lots of air on pumps. Carbons very nice and even and no bad spots. this order was same length as regular

(No 10 = 1892) 10 - 1/2/92

Lamps Made 12

Lamps sent to test room 8 = 0 arc on pumps = These lamps gave off lots of air on pumps. Carbons nice and even and no spots. length same as regular

(2=X = Induction Coil) 12/20/91

Lamps run off on pumps with one pole of induction coil fastened to piece of tin foil which stood behind lamp, and the other pole of induction coil fastened to a piece of sheet tin laying on floor of pump room.

Poles of this order of lamps reversed and flue worked off both clamps. induction coil kept running all the while during lamps were on pumps from start.

(100 6) 12/5/91

Lamps made 6 – All good. no spots on carbons, run same as regulars or about the same in volts

(No 11 = 1892) 1/2/92 (3)

Lamps made 13

Lamps sent to test room 5 = 3 are on pumps and 2 broke by striking in, could not work flue from clamps but carbons very even and no spots.

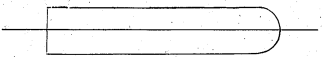
(Below is length of carbon of order No 11)

(No 12 – 1892) 1/2/92

Lamps made 4

Lamps sent to test room 3 – 1 are on pumps. could not work flue from clamps of this order. Carbons very nice and even and no spots

(Below find length of carbons of No 12)

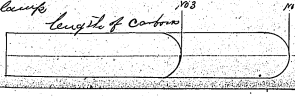


No 13 = 1892) 1/2/92

Lamps made 6

Lamps sent to test room 5 = 1 are on pumps and 4 of these lamps was No 13 = No 3 = the other 4 of this order was No 13 = No 1 = No 2 are on pumps. this order look very nice & even on pumps no spot on carbon but the flue would not work off clamp

length of carbon



(101 E) 12/7/91

Lamps made 6 – 3 spotted
run same as regulars in
volts and exhaustion

(102 E) 12/7/91

Lamps made 6 = All spotted,
run same as regulars in
volts and exhaustion. the
same as regulars

(103 E) 12/7/91

Lamps made 6 = 3 spotted
run same as regulars in
volts and exhaustion

(5)

Edison Order No 300. 1 = 11 = 92
2 Broken
Lamps made 12. Carbons rec'd. 19
Lamps sent to Test room 10
1 crack in seal and 1 poor vacuum,
this order of carbons same
length as regular. 1 carbon
cracked in seal (returned) to lot

Edison Order No 301 1 = 12 = 92
Lamps made 5 = Carbons rec'd. 16
Lamps sent to Test room 5
These lamps gave off lots of
air in pumps. Taking some
time to exhaust. Carbons nice
and even and no spots but dark color
Length same as regulars

Edison Order 302 1 = 12 = 92
Lamps made = 5 – Carbons rec'd. 13
Lamps sent to Test room 5
These lamps gave off lots
of air in pumps, but carbons
were nice and even with no
bad spots. Length same as
regulars

(104 E) 12/7/91

Lamps made 6 = 5 spotted, run same as regulars in volts and exhaustion. but these carbons before being made up in lamps were black in color about 1/2 of carbon from look down toward shank. but burned nearly all off and gave good shining appearance when exhausted.

(105 E) 12/7/91

Lamps made 6 = run same as regulars in volts and exhaustion

(106 E) 12/7/91

Lamps made 6. = All spotted, run same as regulars in volts and exhaustion. these carbons were same as (104 E) and exhausted with same result.

Edison Order 303 Jan 22-92 (7)

Lamps made 6

Lamps sent to test room 4 = 2 spotted

Edison Order 304 Jan-22-92

Lamps made 6

Lamps sent to test room

Notebook, N-91-12-24

This notebook covers the period December 1891-June 1892. It was used by Joseph W. Harris, primarily for notes regarding routine ore assays and other chemical analyses. Included are entries on solutions nos. 1-960, tested to lower the phosphorous content of iron ore concentrate. The book also contains notes and drawings pertaining to insulation, lubrication, and the inductive capacity of metal stearates, as well as a one-page entry concerning the duplication of phonograph cylinders. Material related to the inductive capacity experiments can be found in Arthur E. Kennelly Notebooks #5 and #6. The front cover is labeled "Analytical & Experimental Notes by Jos. W. Harris." The pages are unnumbered. Approximately 180 pages have been used.

Only the material relating to insulation, lubrication, inductive capacity, and phonograph cylinders has been filmed.

N-91-12-24

Jos. W. Harris
Dec 24th 1891.

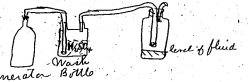
Ash of 13 cm ordinary filter paper, mean of 5 papers

Ash of 13 cm Swedish filter paper, mean of 5 papers.

Ash of 4 inch ordinary filter paper, mean of 5 papers.

Ash of 15 cm ordinary filter paper, mean of 5 papers = 5 milli grams.

Experiment to determine the curve of chlorine absorption of naphthalin, with feeding tube above the surface of the melted mass. thus



Weight of bottle, feeding & exit tubes and 150 grams naphthalin, 549 grams.
Started at 11.10 o'clock the 24th
Weight to be determined each hour.

	Weight.	Gain in Weight
11.10. o'clock	549 grams	
12.00 "	557 "	8 grams.
1.00 "	564 "	7 "
2.00 "	570 "	6 "
3.00 "	576 "	6 "
4.00 "	585 "	9 "
5.00 "	591 "	6 "
6.00 "	593 "	2 "

Started Dec 28th at.

	Weighed.	gains.
11.45	593 gm.	
12.45 "	595½ "	2½ gm.
1.45 "	596½ "	1 "
2.45 "	598 "	1½ "

3.45	598 grams	0 gained

4.00 added 1 3/4 grams crystalized tri chloride of antimony. after it had ceased fuming, at 4.05 o'clock, it weighed 595 1/2 grams.

time	Weight	gain
4.05	595 1/2 grams.	
5.10	601 1/2	6 grams.

Dec 29th 1891

Lubricator Cylinder oiled

9.15	602 1/2	1 "
10.15	607 1/2	5 "
11.00	610	2 1/2 "
12.00	612 1/2	2.5
1.00	614	1.5
2.00	615 1/2	1.5
3.00	616 1/2	1.0
4.00	617 1/2	1.0
5.00	618	0.5

Dec 30th 1891

9.00		
Brought over had gone at 27.0%		
10.00	622	1.0
11.00	623 1/2	3.0
12.00	624 1/2	1.5
1.00	625	1.0
2.00	626	1.5
3.00	627	1.0
4.00	629.5	2.5
5.00	631.5	2.0
6.30	633.0	1.5

(38.5)

Experiments made on the lubricator, Dec. 28th 1891

# 1	Lubricator 3% Paraffin	too soft
# 2	Lubricator 5 % Paraffin	too sift
# 3	Lubricator, 9 % Paraffin,	too sift
# 4	Lubricator 12 % Paraffin	fair
# 5	Lubricator 16 % Paraffin	good
# 6	Lubricator 20 % Paraffin.	Better.

The lubricator is made of 80% Albany grease, and 20% naphthalin. With paraffin, the proportions are

Albany Grease	66.67 %
Naphthalin,	16.67 %
Paraffin,	16.67 %
	100

Dec - 31st - 1891

Generator exhausted during night.

8.45	635 grams	gram
9.00	635 1/4	1/4 "
10.00	635 3/4	1/2 "

Dec. 31st 1891

Experiments on stearates of the metals to determine their specific inductive capacity, for use in high tension condensers.

1

400 grams of commercial stearic acid (from store room) was heated to 300°F and to it, was added, a little at a time, to allow evolution of gas, 16 grams of $PbCO_3$ until it had all combined and the mixture contained stearate of lead and free stearic acid.

2

Same as above, 400 grams stearic acid, and 140 grams $PbCO_3$ Compound is known as "Acid stearate of lead".

Jan 5th 1892.

#3

Same as above, 200 grams Oleic acid, 2.5 grams Cu^2CO_4 (green carbonate). This seems to leave an insoluble residue after all lead combined.

#4.

Same as above, 200 grams Oleic acid 25 grams Cu^2CO_4 (green carbonate) Operation conducted at 275° + gives off gas readily and does not foam.

Jan 5 1892

Same as above, 200 grams $C^{18}H^{36}O^2$ 4.1 grams $FeCO_3$.

6

Same as above, 200 grams $C^{18}H^{36}O^2$ 4.1 grams $FeCO_3$

Analysis of sample marked
21 3rd, for P.
weight for, 100 grams, all treated
digested in a mixture of HNO_3
& HCl, having residual excess
of HNO_2

0.9911

Sp.

1.23 mg.

0.0123% phos

Copper or [illegible]
0.037 % phos

Experiment on the chlorination
of coronula wax for duplicating cylinders
5 bottles of wax, each holding 1 lb.,
labled #1 - #2 #3 #4 #5, one to
have varying quantities of chlorine passed
through, each from a separate generator,
in the proportion of the numbers thus
#1 have 200 grams Hcl, & 50 grams
of MnO_2, #2 have 400 grams Hcl,
& 100 grams Hcl to #5 have 1000 grams
Hcl, & 250 grams MnO_2.

Sp.G. of Hcl 1.175, 8500 = 100 grams

#1 - 50 MnO_2 - 200 Hcl
not very satisfactory

#2 - 100 MnO_2 - 400 Hcl

#3 150 MnO_2 600 Hcl

#4 200 MnO_2 800 Hcl

#5 250 MnO_2 1000 Hcl.

Treatment of Ogden Ore with various substances to oxydize the metallic iron.

The ore to be in 100 gram lots, after treatment, first not if any of the substances, and as lime, alumina, iron, have been dissolved, then filtering water, for different length of time.

1% solutions of various chemicals, such as sodium nitrate, sodium sulphate, sodium chlorate, O from salt and others.

To be in quantities of 10 lbs per ton which is $\frac{1}{224}$ part of the weight used = 0.444 gram per 100 grams of ore.

#1

100 grams ore
100 cc H_2O boiled for 1 hour
0.444 NaCl.

#2

A few clean cast iron filings boiled with tap water.

#3.

100 grams ore
25 cc H_2O
1/4 cc pyrolegnaus acid, = about 5 lbs per ton of ore.

#4

Iron filings, H_2O + NaCl boiled, but not to be boiled dry

#5 Iron filings H_2O + $NaSO_4$ boiled as #4

#6 Iron filings, H_2O_x
pyroligneous acid

#7 - 100 grams roasted
ogden ore, about 50 cc of H_2O.
3 cc HNO_3 to the ton, = about
1/4 of a c.c.

#8 Iron filings,
Epsom Salt,
H_2O

#9

Experiment on deposition of lead plates.

Two samples, Edison Gen. Co & Western Elec Co —

Each piece of lead weighed by Hooper, of the Galvanometer room, & stamped successively 1-20 & 21-40

Twenty different solutions made, with duplicate, (21-40) as below.

1-20 Edison		21-40 Western
1	5%	Solution of Carbolic Acid
2	5%	Creosote
3	5%	Wood tar
4		250 cc. Saturated CO_2 Water
5		250 " " $CaCl_2$ water
6	5%	H_2SO_4
7	5%	Acetic Acid
8	1%	HNO_3
9	5%	Sulphide of Sodium
10	5%	H_2SO_3
11	5%	$NaOH$
12	5%	Na_2SO_4

13	5%	Alum (common)
14		Crudi. Cresoli (concentrated)
15	5%	Hcl
16	5%	Phosphate in Citrate of Na
17	5%	NH_4OH
18	5%	Chloride of Ammonia
19	5%	Na Cl
20	5%	each, Ca SO_4, Fe SO_4 Cresoli
		4 Carbolic acid all mixed in
		200 cc H_2O

	Weights	on	April 14th Wind
1	15.521	21	18.525
2	17.306	22	18.132
3	17.425	23	17.046
4	17.521	24	17.962
5	17.582	25	17.913
6	17.684	26	17.223
7	17.551	27	18.930
8	17.290	28	19.732
9	17.303	29	18.865
10	16.423	30	19.063
11	17.521	31	18.739
12	17.599	32	18.239
13	17.642	33	18.204
14	17.598	34	19.180
15	17.480	35	18.242
16	17.444	36	19.986
17	17.453	37	19.148
18	17.537	38	18.698
19	16.388	39	18.892
20	16.423	40	17.400

Weights of April 20th

	Edam		Mishri
1	15.519	21	18.527
2	17.292	22	18.130
3	17.420	23	17.040
4	17.520	24	17.964
5	17.575	25	17.714
6	17.612	26	17.230
7	17.512	27	18.905
8	17.210	28	18.838
9	17.301	29	15.568
10	16.419	30	19.064
11	17.503	31	18.726
12	17.602	32	18.246
13	17.638	33	18.206
14	17.562	34	17.182
15	17.446	35	18.214
16	17.431	36	17.980
17	17.442	37	19.150
18	17.533	38	18.701
19	16.390	39	18.894
20	16.423	40	17.400

	April 15th Coined with P.P.S.A.		April 20th after 5 days.
1a	22.785	1a	22.785
2a	21.015	2a	21.005
3a	21.700	3a	21.775
4a	22.435	4a	22.435
5a	21.740	5a	21.740
6a	22.630	6a	22.630
7a	22.810	7a	22.785
8a	25.510	8a	24.785
9a	21.300	9a	21.300
10a	24.940	10a	24.940
11a	25.240	11a	25.220
12a	24.000	12a	24.000
13a	21.600	13a	21.600
14a	21.060	14a	21.060
15a	21.790	15a	21.780
16a	22.065	16a	22.056
17a	24.930	17a	24.930
18a	25.450	18a	25.450
19a	26.600	19a	26.600
20a	25.370	20a	25.370

	April 20th 5 oz. Pure Lead		
21P	13.166		Pure Phenol
22P	13.330		
23P	13.248		Pure Isoamyl Alcohol
24P	13.013		
25P	13.284		Methyl Alcohol
26P	13.212		Isopropyl Alcohol "
	April 25th		May 13th 1892
P21	13.111	21P	13.005
P22	13.298	22P	13.095
P23	13.248	23P	13.242
P24	13.023	24P	13.020
P25	13.180	25P	12.965
P26	13.130	26P	12.965
	April 29th		
21P	13.061		
22P	13.253		
23P	13.248		
24P	13.020		
25P	13.053		
26P	13.063		

Solution	April 18th		Lead
	50% acetic		50% acetic
41	22.955	41	27.370
42	16.535 CO_2 50%	42	25.930 CO_2 50% acetic acid
41a	12.775	41a	26.220
42a	7.640 CO_2	42a	29.120 CO_2
	April 21st		
41	22.941	41	27.350
42	16.531	42	25.930
41a	12.779	41a	26.220
42a	7.634	42a	29.120
Solution	April 25		Lead
41	22.927	41	27.323
42	16.530	42	25.929
41a	12.265	41a	26.785
42a	7.634	42a	29.109
	April 25th		May 4th
100P	15.812 Pure Naphthalene	100	15.812
	April 29th		May 13th
100P	15.813	100	15.812

April 22 - 1945

	Edison		Western Elec.
1	15.522	21	18.579
2	17.266	22	18.125
3	17.412	23	17.038
4	17.521	24	17.962
5	17.587	25	17.915
6	17.689	26	17.231
7	17.424	27	18.870
8	17.145	28	18.623
9	17.304	29	18.869
10	16.910	30	19.062
11	17.492	31	18.908
12	17.606	32	18.747
13	17.640	33	18.206
14	17.522	34	17.183
15	17.438	35	18.210
16	17.432	36	17.980
17	17.449	37	17.952
18	17.531	38	18.707
19	16.383	39	18.894
20	16.455	40	17.401

Pure tone

	April 21st	Number wheel	April 25th
50	0.788	2	.788
51	0.709	3	.711
52	0.802	4	.802
53	0.786	6	.775
54	0.765	7	.727
55	0.786	8	.776
56	0.838	9	.838
57	0.818	10	.819
58	0.760	11	.760
59	0.747	12	.746
60	0.846	13	.845
61	0.771	14	.770
62	0.819	15	.798
63	0.732	16	.731
64	0.789	17	.788
65	0.682	18	.681

.788 before removing defective

Low tumbler with Edison

April 19th Pin load.		April 23. 1932	
	P.		
1 P	12.880	1 P	12.874
2 P	13.320	2 P	13.294
3 P	13.080	3 P	12.990
4 P	13.230	4 P	13.220
5 P	13.210	5 P	13.211
6 P	12.590	6 P	12.886
7 P	13.370	7 P	13.353
8 P	13.090	8 P	13.032
9 P	13.390	9 P	13.326
10 P	13.350	10 P	13.339
11 P	12.840	11 P	12.819
12 P	13.160	12 P	13.157
13 P	13.160 in #13 tube Sample	13 P	13.163
14 P	13.160 in #14 tube Sample	14 P	13.145
15 P	12.780 tube	15 P	12.734
16 P	13.220	16 P	13.213
17 P	12.670	17 P	12.665
18 P	12.960	18 P	12.953
19 P	12.900	19 P	12.895
20 P	13.450	20 P	13.437

April 25th Tag arrived with Sulphur			Solutions made on April 25th of course # 101 put in #1 tube
		P	
1a	22.785	101	18.516 #1
2a	20.991	102	17.710 #2
3a	21.764	103	15.909 #3
4a	22.436	104	18.138 #4
5a	21.735	105	17.792 #5
6a	22.619	106	15.787 #6
7a	22.755	107	17.003 #7
8a	24.590	108	16.568 #8
9a	21.297	109	12.833 #9
10a	24.938	110	16.431 #10
11a	25.191	111	17.405 #11
12a	23.893	112	15.811 #12
13a	21.583	113	13.051 #13
14a	21.059	114	17.286 #14
15a	21.758	115	17.678 #15
16a	22.046	116	16.413 #16
17a	24.922	117	12.676 #17
18a	25.449	118	15.883 #18
19a	26.592	119	17.486 #19
20a	25.368	120	16.692 #20
		121	17.141
		122	18.226
		123	17.058
		124	20.040

Put in Rx 4 oxpne.

April 27th 1932 5:40 AM

	April 26th 1892		
	Edison		Herlam Chab
1	13.523	21	18.530
2	17.237	22	18.122
3	17.401	23	17.030
4	17.520	24	17.964
5	17.584	25	17.914
6	17.689	26	17.231
7	17.448	27	18.838
8	17.085	28	18.783
9	17.302	29	18.868
10	16.406	30	19.062
11	17.474	31	18.686
12	17.604	32	18.248
13	17.639	33	18.209
14	17.489	34	18.181
15	17.435	35	18.215
16	17.430	36	17.979
17	17.448	37	19.151
18	17.523	38	18.699
19	16.392	39	18.893
20	16.421	40	17.378

	April 29th		May 4th 1892
101	18.503	101	18.478
102	17.694	102	17.694
103	15.905	103	15.898
104	18.132	104	18.115
105	17.783	105	17.773
106	15.778	106	15.760
107	17.003	107	16.993
108	16.565	108	16.551
109	12.808	109	12.773
110	16.428	110	16.423
111	17.407	111	17.394
112	15.793	112	15.787
113	13.045	113	13.043

May 2nd 1892
Weights of blocks
Pure lead in

			May 6th 1892
125	16.625	125	16.617
126	16.425	126	16.425
127	16.604	127	16.604
128	16.575	128	16.546

Ok 5.30 PM.

	Pure		Lines
	April 29th		May 4th 1900
50	0.789	50	788
51	710	51	709
52	803	52	803
53	766	53	758
54	721	54	714
55	770	55	759
56	836	56	832
57	818	57	818
58	757	58	758
59	746	59	745
60	845	60	845
61	770	61	770
62	776	62	581
63	732	63	731
64	789	64	788
65	681	65	679

	Weights of lead		May 4th
	Pure		
129	16.500	129	16.500
130	16.720	130	16.720
131	16.670	131	16.670
132	16.480	132	16.480
133	16.745	133	16.745
134	16.745	134	16.745
135	16.740		
136	16.740		May 9th 1902
137	16.595	129	16.446
138	16.720	130	16.664
139	16.840	131	16.608
140	16.645	132	16.474
141	16.690	133	16.732
142	16.700	134	16.738
143	16.760		
144	16.665		
145	16.690		
146	16.000		
147	16.032		

Lines made May 2nd

Affidavit May 2

1/-30 Mich.

	Edison May 4th		Nerlin May 4th
1	15.534	21	18.530
2	17.226	22	18.116
3	17.391	23	17.027
4	17.521	24	17.962
5	17.584	25	17.914
6	17.290	26	17.231
7	17.399	27	18.790
8	16.975	28	18.824
9	17.304	29	18.868
10	16.407	30	19.055
11	17.470	31	18.656
12	17.606	32	18.247
13	17.642	33	18.210
14	17.455	34	19.182
15	17.437	35	18.217
16	17.429	36	17.977
17	17.449	37	19.151
18	17.516	38	18.691
19	16.393	39	18.892
20	16.420	40	17.394

	May 4th 1892		May 10th 1892 at 4½ o'clock
114	17.284		
115	17.674	129 p	16.500
116	16.363	130 p	16.720
117	12.348	131 p	16.670
118	15.883	132 p	16.480
119	17.468	133 p	16.745
120	16.679	134 p	16.745
121	17.156	135 p	16.740
122	18.225	136 p	16.740
123	17.040	137 p	16.595
124	20.013	138 p	16.720
		139 p	16.840
	Nerlin	140 p	16.645
	Clean Cathode	141 p	16.690
		142 p	16.700
	May 9th	143 p	16.760

		Tuesday		
150°	15.807	129	144 p	16.665
151°	16.072	130	145 p	16.690
152°	15.461	131		May 11th at 11 o'clock
	May 10th	132	146 p	16.700
150°	15.795		147	16.032
151°	16.068			
152°	15.461			

	May 16th		May 12th
148	16.360	1 P	12 877
149	16.178	2 P	13 200
150	16.128	3 P	12 950
151	16.121	4 P	13 220
152	15.860	5 P	13 210
153	15.883	6 P	12 885
154	16.599	7 P	13 305
	May 20th	8 P	12 965
148	16 355	9 P	13 325
149	16 172	10 P	13 343
150	16 128	11 P	12 790
151	16 121	12 P	13 160
152	15 861	13 P	13 172
153	15 884	14 P	13 127
154	16 461	15 P	12 680
		16 P	13 210
		17 P	12 665
		18 P	12 955
		19 P	12 890
		20 P	13 435

	May 12th		May 13th
41	22 785	41	Solids 22.872
42	20 955	42	16.525
43	21 745	42a	12.167
44	22 435	42a	7.630
45	21 735		Lead
46	22 620	41	27.320
47	22 647	42	25.920
48	24 902	42a	26.585
49	21 300	42a	29 695
50	24 940		
51	25 100		
52	23 995		
53	21 587		
54	21 050		
55	21 750		
56	22 040		
57	24 925		
58	25 427		
59	26 585		
60	25 365		

	May 13th 1942		May 14th
101 p	18.432	135	16 737
102 p	17.630	136	16 740
103 p	15.890	137	16 585
104	18.095	138	16 690
105	17.765	139	16 825
106	15.735	140	16.647
107	16.970	141	16 670
108	16.535	142	16 675
109	12.702	143	16 755
110	16.412	144	16 660
111	19.352	145	16 685
112	15.280	146	15 795
113	13.020	147	16 045
114	17.920		May 15th
115	17.670	135 p	16 726
116	16.310	136	16 735
117	12.650	137	16 569
118	15.850	138	16 641
119	17.465	139	16 810
120	16.680	140	16 645
121	17.130	141	16 645
122	18.230	142	16 642
123	17.020	143	16 745
124	18.995	144	16 648
		145	15 945
		146	16 034

	May 20th		May 21st 1942
115	16 617	135	16.723
116	16.426	136	16.733
117	16.604	137	16.559
118	16 481	138	16.620
119	16.378	139	16.804
130	16 593	140	16.644
131	16 537	141	16.639
132	16 462	142	16.622
133	16 717	143	16.738
134	16 723	144	16.640
		145	16.622
		146	15.932
		147	16.027

A piece of pure lead was put in a solution of stannous chloride (concentrated) for 1 hour. A coarse deposit of tin was made all over the surface, placed in crucible on April 25th
Weighed on April 25th
12.9416 grams lead, washed, 80.0%
Annealed at 9.15 A.M.
Wt. 12.936 grams.

Assay for a sample of ore received from A. F. Lewis, Fort Bidwell, Modoc Co, Cal, which is supposed to contain platinum.

10 grams Ore,
80 " Granulated lead,
5 " borax.

Contains no platinum.

April 25th

Solutions of coal tar creosote with other substances to neutralize the acids contained to prevent corrosion of lead.

#1	Creosote, small quantity of NaO,	mixed by Mr. Eaton
102 #2	" Larger " "	mixed by Mr. E.
103 #3	Creosote, about 1/20 solution of slaked lime	slaked with minimum water
104 #4	" " " 1/10 " " " " "	
105 #5	" " 1/20 of NaO & 1/40 of H_2O	
106 #6	" & Sodium Carbonate	
107 #7	" & Zinc Chloride	
108 #8	" Barytes -	
109 #9	" Litharge	
110 #10	" Common salt	
111 #11	" Iron filings (cast iron)	
112 #12	" heated with water, which dissolved some creosote	
113 #13	Water from #12 contains creosote	

April 26th -

Reading		
114	114	Acetone Conc
115	115	Ortho-Cresol Conc
116	116	Meta Cresol "
117	117	Meta Xylenol "
118	118	Alpha Naphtol in $CHCl_3$
119	119	Beta Naphtol " "
120	120	Boracic Acid in H_2O
121	121	H_2S Water Conc
122	122	Ammonium Sulphide Conc
123	123	" Sulpho Cyanide Conc
124	124	Ammonium Chloride Conc
125	125	Aniline Oil conc
126	126	Pyridine conc
127	127	tap Water
128	128	Beech Wood Tar Creosote

May 4th 1892.

Solutions of Creosote, + Creosote prepared with salt, to confirm results of #110 of April 25th

129	Pure Coal tar Creosote
130	" " " "
131	" " " "
132	" " " " salt
133	" " " " treated with
134	" " " " "

May 10th 1892

135	Creosote treated with	$CaCl_2$
136	" " "	Na_2SO_4
137		$NaNO_3$
138		Sodium silicate
139		$MgSO_4$
140		10% H_2SO_4 & H_2O
141		$NHSO_4$
142		Na_2CO_3
143		Resin
144		Fe_2O_3
145		$Fe\ SO_4$
146		MnO_2
147		$SnCl_2$

May 10th 1892 at 4.15

May 16th 1892

148	Creosote &	$CaCl_2$
149	"	" " "
150	"	Na_2SO_4
151	"	" "
152	"	H_2SO_4 10%
153	"	" " "
154	"	NH_4OH

Exp. The distillation of fusel oil, for amylene.

Ordinary fusel oil was mixed with chloride of zinc & caustic potash to absorb moisture, and distilled at a temp of 130°C. (266°F.)

A yellow fluid came over which on test did not act like amylene, only treated once, and had an oily nature.

The same mixture was distilled at a lower temperature and a colorless aromatic fluid came over the vapors of which attacked the cork, and broke it.

At a higher temperature a yellow oily fluid came over of an oily nature which unlocked a lamp like amylene, but not nearly so well. It only treated once on the pump.

Notebook, N-91-12-30

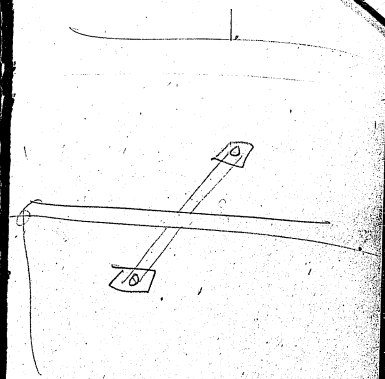
This notebook covers the period December 1891-January 1892. It was used by Arthur E. Kennelly and an unidentified experimenter as a rough record book in the Galvanometer Room. Most of the book contains notes and calculations regarding conductor determinations for the electrical system at the Columbian Exposition. There are also notes relating to meter tests and dynamometer calibration. Transcriptions of the meter and dynamometer entries can be found in Arthur E. Kennelly Notebook #6. The spine is labeled "129." The book contains 201 numbered pages and has been used in both directions.

Only the material relating to conductor determinations has been filmed.

XE-172

N-91-12-30

①

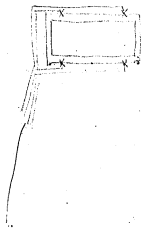


Determination of
Conductors for the
World's Fair

Basis :-

Incandescent lamps in building	93,450
" outside :-	16,000
	109,450
Grounds	22,000
	131,450
Arc lamps 5000 @ 20	100,000
Total	231,450
	2,365

H.



Drop allowed on services 3 %

Drop allowed on mains 3 %

6200 feet [illegible] main cond
10 000 [illegible] 1½ [illegible] fall
Main 700 [illegible]

Mines Building

Incandescent	5000
Exterior	1000
Arcs 45 @ 20	9000
	15000 lts
	1870 γ

Four feeding points situated at
1 2 3 4

Feeder terminates at bifurcation of subway

Subfeeder	1	1150'
	2	750
	3	750
	4	575'

1 Feeding point in center distant 1950' carrying 1870 γ

Transportation Building

Incandescent

Arcs	444 @ 20	3000
		8880
		11,880
		1485

Distance via Mines Building

920 + 1950 = 2870'

Carrying 1485 amp.

Manufactures + Liberal Arts

Incendio cento inside	10,000
Area 1700 @ 20	34,000
Incendio cento esterni	2700
	37,700
	4700

#1	3600
#2	4050
#3	3150
#4	2250
#5	3050
	16,100

Agriculture

Incandescents	5000
Arc 648 @ 20	12,960
Estimate	1,040
	19,000
	2,400

1600 feet via [illegible]

Telephone [illegible]

	19,000
Cisterns	1000
Passages	250
Annex	21,00
	22,350
	2,800

100 100 100

1000 1000 100

U. S. Government

Incandescents. 4000

Fisheries

Incandescents 1000

Arc 175 @ 20 3500

8500

1060

4700 feet 1060

$$\frac{4520 \times 750}{40}$$

110 × 750 = 8

750
82500
92
900

100 100 100 1

750 1600 7½

0.7

Womens Building

Inc 3500

Horticulture

Inc 1000

Acc 2870 5000

9000

1100

1650 + 2870 = 4520

1400
400
1800

(23)

Art Galleries ~~£6~~
including all Domestic
+ Foreign Countries 20.000 inc.

£4500 + 1600 = 6300'

Results of Interview with (27)
Mr Steiniger 30th Dec 31

Incandescent creating of 10 cp. lamps on buildings fronting Basin. Current to be supplied independently.

2000' on each side
600' " side each end

5200 x 2 / 3 = 10400 / 3 = 3500
2000 on Bot building & Cabins
5500

Total 5500 lamps on creating of facing

On face of embankment 2480 lamps of 16 cp. each. canal 880

Border of flower beds @ 1' apart 3770 10 cp

7130

Administration Buildings 4000
creating of same 2000

13,130

The Theatre may take 6000 lights of 16 cp.

2000 arc lights of 2000 cp each are proposed in the grounds with suitable subways + duct to be detailed with specification

Arc lights on posts are distributed at dist: of 50' round main building.

Basis of new determination

115-volt lamp 3.1 watts per candle

20 candles

= 63 watts = $\frac{63}{115}$ = 0.55 amp each

10 cp lamps 2 in series = 0.55 amp

or 0.275 amp each.

Music Hall 1000 lights 20 cp.

= 275 ampères 3 wire 230 volts

Distance 3100'

25 volts drop.

$$\frac{275 \times 3100}{25} = \frac{341,00}{\frac{34}{375}} = \# 400$$

Taking for 250 lamps along
Coolbrook on same feeder
gives 1.25 % extra current
or 34 more amp. = 309 amp
say 310 and the conductor
required = 375 + 47 = 422 say
# 500.

Alternative plan

Music Hall	1000	20 cp	= 1000
Casino	1000	[illegible]	1000
Colonnade	250	10 cp	250
			2250

Casino

1000 20 cp lamps

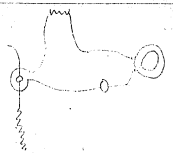
add in ½ Colonnade or 250 10 cp.

= 1125 ÷ 4 = 281 + 28 = 309 amp.

Distance 2400 feet

$$\frac{2400 \times 309}{24} = \frac{309.00}{31}$$

3440



Best conditions for States
1 Foreign Buildings, permanence
for 3000 with such provision
for ~~indefinite~~ increase

Stadia Building and
Midway Pleasance.

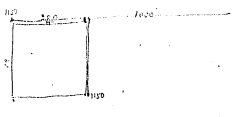
24,500 lights installed for
Distribution and Power
Pleasance 1,900 lights ~~in State~~
10,500 incandescent 3500 in Illinois
Exhibits

Cable of Electric Car behind Annex
of Arts Building

7350 feet

Part installed will be alternating.

Administration Building



5100 incandescent lamps of 16 c.p. 55 watts each ½ amp.

12475 amperes and 110 volts.

3250 interior lamps

on one circuit (say) = 812 amperes = # 1000

1824 exterior lamps

on the other circuit = 456 amperes = # 500

18 Sec. × 50 = 18,200 = 91,200 = 91 KWTs

Add 10% for drop = 100 KWTs.

Requirements

For interior lighting (via subway)

[illegible]00 ft: # 1000 tube 812 amp. 3250 lamp.

[illegible]00 - # 500 - 406 - 1625 -

[illegible]00 - - 500 - 406 - 1625 -

For exterior lighting via subway

[illegible]00 ft # 500 tube 456 amp. 1824 lp.

[illegible]00 - # 500 -

[illegible]00 - # 500 -

[illegible]tal underground conductor

900 feet of # 1000

1900 - # 500

[illegible]1 × 10⁻⁴ × 9.0 × 10⁶ = 10 × 10⁻³ = 1 × 10⁻² = 0.01 ω 8.12 volt drop

[illegible]1.1 × 11.5 = .00126 × 800 = 10 volt drop.

812 amp. × 120 volts = 900 KWTs

Interior generators 2 of 100 KWTs, each 120 volts (800)

Exterior generators 2 of 50 KWTs, each 120 volts (456)

Total power 300 KWTs.

Agriculture

3200 16 cp lamps inside

800 " " " outside

---

to D 1200 D to E 950.
D to F 950

800 amps $1000 L.L. to D

2150 feet 800 amp 1.1×10^{-6}
3.42×10^{-6}

$17.2 \times 10^{5} \times 1.1 \times 10^{-5}$ = 19.9 19 volts

3300' of #500

130 volts × 800 amps = 104.00

Two generators 100 KWTs each 1300. 800 amp

Estimate to D and E 2150' 800 lamp
200 amp.
1200 feet to E

$250 \times 19 \times 4.3$
0.

Facade is 1300' long. 800 lamp.
8" apart approx.
800 feet = $\frac{8}{12} \times 800 = \frac{640}{12} = 500$ lamps
250 amp. carried 400 feet = 100,000
2 volts " 50,000 = $500

$1200 \times 10^{3} \times 1.1 \times 10^{-5} \times 8.00 \times 10^{2}$
$1.2 \times 10^{3} \times 9.9 \times 10^{-3}$
$= 1.2 \times 10 =$
$9.5 \times 10^{2} \times 1.1 \times 10^{-5} \times 4.0 \times 10^{2}$

$4.3 \times 10^{-5} \times 10^{5} = 4.3$

Music Hall v. Cosmo

2750' to I where feeder bifurcates.

300 ft each way from JK JL

3500 16 cp lamps = 875 amp.

#1000 leader

Drop $.0875 \times 10^3 \times 3.05 \times 10^3 \times 1.1 \times 10^5$.

$= 2.935 \times 10^1 = 29$ volts.

then feed of #5000 main in each building

500 " " #500 " " consider.

Basin

$\frac{\pi^5}{16_6} \times 0.5 = \frac{0.31}{5} = 0.36 \sim 0.33$

$\frac{70.80}{2} = 2360 = 1180 \times 250 = 295$ K

300 KUTS.

$50 \times \frac{5}{8} = \frac{25}{8} = 31$ inch

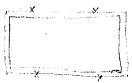
7000 = 283

Manufactures

9500 lamps of 16 cp inside

2375 outside

1670 x 790 = 2460 x x = 4900



Sign outside in each Bridge

M	2250	1050	850	1	650.000
N	3200	1900	1700	2	1300.000
P	3150	1550	1700	2	1350.000
B	4000	2700	2500	3	2000.000

$2250 - x = \frac{1}{3}(6000 - x)$

$7050 - 3x = 6000 - x$

$2x = 3050$

$x = 1525$

100 150 100 = 1
600 600 600 = 6

Music Building

2500 16 cf. interior 700 cf
[illegible] exterior 50 "

Tenor 1500' to R
R [illegible] 500
R [illegible] 500
2500' of [illegible] sound building

Transportation

23.00 [illegible] ft. 16 cf

[illegible]

1.56 x 3000 = 5580

Homeward 3000
Return 26500
29,500

2950 lbs = 440
50
149,500 150 KWTs × 1.1 = 165 KWTs.

~~3000 lbs~~ 370 amp

5000 feet to bank!
300 ft pulleys.

50 volts drop . $\frac{5000 \times 37.0}{50}$ = 400
400 lube.

Illinois
2500 lbs = 313 amp @ 440 volts.

Estimo marginale sup. to 500 lt.
per frank in benzin
1000 in alk. in Manufactures
500 in Trans
500 - Naftaline
500 - "

Government & Fuchsia

5000 Govt of 16 cp
500 Fuchsia 16 cp
5500

Double three wire system

625 amp in Govt
63 " Fuchsia
688 " Both at 220 volt

$\frac{688 \times 1.250}{6.5} = 6.25 \# 443$ say #500 cable

$\frac{688 \times 1.250 \times 688}{6.5} = 58.5$ volt drop

46 - 47	750	312 amp	#500	3.8
46 - 48	600	312 "	#500	2.8
46 - 49	750	63 "	# 250	2.0
49 - 50	300	32 "	# 250	0.4
49 - 51	300	32 "	# 250	0.4

$\frac{750 \times 312}{5} = 450$

Notebook, N-92-02-17

This notebook covers the period February-June 1892. It was used by J. S. Emmons as a logbook for filament experiments, nos. 2-162. The pages are unnumbered. Approximately 30 pages have been used.

N-92-02-17

XE-172

Feb 17 1992

J. S. Simmons

Feb 17/872 Emmons # 2

Treated 2 lamps with another good results no blue on clamp & very little blue on bulbs measured 51 volts

Feb 17/872 Emmons # 3

Treated 2 lamps same as above good results no blue on clamps bulbs Discolored measured 49-34

Feb 18/872 Emmons # 4

Treated 2 lamps same as above good results but bulbs Discolored on bulbs 50 volts

Feb 23 Emmons # 5

2 lamps treated with methyl alcohol & Nitrites Deposit blue off of clamps on bulbs 56 volts

Feb 23 Emmons # 6

2 lamps treated the same as # 5 Deposit the same 53 volts

Feb 23 Emmons # 7

2 lamps treated the same as # 5 only lamps taken off of treating bath & run sealed on machine no blue on clamps

Feb 23 Emmons # 8

2 lamps treated the same as # 5 bulb a little Discolored

Feb 23 Emmons # 9

2 lamps treated the same as # 5 bulbs very much Discolored

Feb 23 Emmons # 10

2 lamps treated the same as # 5 very little Discolour on bulbs

Feb 23 Emmons # 11

2 lamps treated the same as # 5 only run through with out worked on 200 air

Feb 24 Emmons # 12

2 lamps treated the same as # 11

Feb 24 Emmons # 13

2 lamps treated with methyl alcohol treated on 120 air blue on clamps

Feb 24 Emmons # 14

1 lamps treated with commercial alcohol very slow to Deposit

Feb 24/892 Emmons # 15

2 lamps the same as # 5 only run off on 120 air

Feb 25 Emmons # 16

2 lamps treated the same as # 15

Feb 26 Emmons # 17

2 lamps treated with methyl alcohol & naptha good Deposit on carbons very little Discolored

Feb 26 Emmons 18

2 lamps treated the same as # 17

Feb 26 Emmons # 19

2 lamps treated with 1/2 methyl alcohol 1/2 gasoline good Deposit on carbon bulbs a little Discolored

Feb 27/892 Emmons # 20

2 lamps treated with methyl alcohol naptha bulb a little Discolored

Feb 27/892 Emmons # 21

1 lamps treated with methyl alcohol naptha bulbs a little Discolored blue on clamps

Feb 29 Simmons #22

2 lamps treated with the same as #21 about the same result

Feb 29 Simmons #23

2 lamps treated with 1/2 Gasolin & 1/2 amyl acetate good Deposit on carbon bulb blue on clamp & will not work off

Feb 29 Simmons #24

2 lamps treated with 1/2 methyl alcohol 1/2 naphtha bulb a little Discoloured

Feb 29 Simmons #25

2 lamps treated 1/2 amyl acetate & 1/2 Gasolin taken off of treating lamps & run off on another no blue on clamp

Feb 29 Simmons 26

2 lamps treated with Xylol very quick Deposit on carbon no blue on clamp but bulbs very badly Discoloured

Feb 29 Simmons #27

2 lamps treated with 1/2 naphtha 1/2 methyl alcohol no blue on clamp bulb very little Discoloured

Feb 29 Simmons #28

2 lamps treated with 1/2 Gasolin & 1/2 amyl acetate good Deposit on carbons blue clamp & will not work off bulb not Discoloured but very little

March 1st Simmons #29

2 lamps treated with Xylol bulbs very badly Discoloured impossible to get them without

March 1st Simmons #30

2 lamps treated with methyl alcohol naphtha bulbs a little Discoloured no blue on clamp

March 1st Simmons #31

2 lamps treated with Xylol Quick Deposit on carbon bulbs very black no good

March 1st Summons 32

2 lamps treated with 1/2 amyl & 1/2 Gasolen bulbs Discoloured & blue on clamp & will not work off

March 1st Summons # 33

2 lamps treated with the same as # 32 about same results

March 1st Summons # 34

2 lamps treated Gasolen & methyl alcohol bulbs not Discoloured but blue on clamps

March 1st Summons # 35.

2 lamps treated with Xylol & methyl alcohol good Deposit on carbon bulb a little black on blue on clamp

March 2 Summons # 36

2 lamps treated with Xylol & methyl alcohol good Deposit on carbon & no blue on clamp bulb a little Discoloured

March 2 Summons 37

2 lamps treated with amyl & Gasolen bulbs a little Discoloured good Deposit on carbon blue will not work off of clamp

March 2 Summons # 38

2 lamps treated with methyl alcohol Xylol on blue on clamp good Deposit on carbon bulbs a little Discoloured

March 2 Summons # 39

2 lamps treated with Gasolen & amyl bulbs Discoloured blue will not work off of clamp with good Deposit on carbon

March 2 Summons # 40

2 lamps treated with 1/2 amyl & 1/2 Xylol very blue Deposit on carbon blue will not work off clamp & bulb very much Discoloured no good

March 3 Summons # 41

2 lamps treated with methyl alcohol & Xylol good Deposit on carbon very no blue on clamps bulbs a little Discoloured

March 3 Summons # 42

2 lamps treated with Gasolen & Xylol good & much Deposit on carbon no blue on clamp bulb a little Discoloured

March 3/99 Summons 43

2 Lamps treated with amiol & Xylol good Deposit on carbons ~~&~~ blue on clamps and bulbs very black

March 3. Summons 44

2 lamps treated with Xylol & Gasolin bulbs Discoloured good Deposit on carbons & no blue on clamp

March 3 Summons 45.

2 Lamps treated with Turpentine & Xylol very slow Deposit bulbs very black & blue on clamp

March 4 Summons 46

2 lamps treated with amiol & Xylol bulbs very black blue thick not worth of clamp but good Deposit on carbons

March 4 Summons 47

2 lamps treated with Gasolin & Xylol good & quick Deposit on carbons no blue on clamp bulb with very much Discoloured

March 4 Summons #48

2 lamps treated with Benzole & Xylol bulbs very black good Deposit on carbons & no blue on clamp.

March 4. Summons #49

2 lamps treated with Naphtha & Xylol good Deposit on carbons & no blue in clamp but bulbs quite Discoloured

March 5. Summons #50

2 lamps treated with Ether & Xylol bulbs quite Discoloured slow Deposit on carbons no blue on clamp

March 5 Summons #51

2 lamps treated with Naphtha & Xylol good Deposit on carbons no blue on clamp bulbs quite Discoloured

March 5 Summons #52

2 lamps treated with acetone & Xylol very slow Deposit on carbons bulb a little Discoloured no blue on clamp

March 7 Gummous # 53

2 lamps treated with oil camphor & xylol slow Deposit on carbons bulbs quick Discoloured no blue on clamps

March 7 Gummous # 54

5 lamps treated with purified alcohol & Naphtha good Deposit on carbons very little blue on clamps bulbs but little Discoloured

March 7 & 8 2 Gummous # 55

5 lamps treated the same as # 54 about same results

March 8 Gummous # 56

2 lamps treated with Kerosene oil good & quick Deposit on carbons bulbs very little Discoloured but blue hard to work off of clamps

March 8 Gummous # 57

2 lamps treated with alcohol amylic & xylol slow Deposit bulbs very black no blue on clamps

March 8 Gummous # 58

2 lamps treated the same as # 57 about same results

March 8 Gummous # 59

2 lamps treated with Kerosene good & quick Deposit on carbons bulbs very little Discoloured but blue on clamps

March 9 Gummous # 60

2 lamps treated with Kerosene oil good & quick Deposit on carbons bulbs a little Discoloured but blue on clamps

March 9 Gummous # 61

2 lamps treated the same as # 60 about same Results

March 9 Gummous # 62

2 lamps treated with Kerosene & xylol good & quick Deposit on carbons bulbs quick black no blue on clamps

March 9 Gummous # 63

lamps treated the same as # 62 about same Results

March 9 Summons # 64

2 lamps treated with methyl alcohol & Kerosene good Deposit on carbons bulbs very little Discoloured but blue on clamp

March 9 Summons # 65.

2 lamps treated with Kerosene & Xylol good Deposit on carbons no blue bulbs quite Discoloured

March 10 Summons # 66

2 lamps treated with methyl alcohol & Kerosene good Deposit on carbons blue on clamp bulb very little Discoloured

March 10 Summons # 67

2 lamps treated with Kerosene & Naphtha good & quick Deposit on carbons no blue on clamp bulbs a very little Discoloured

March 10 Summons # 68

2 lamps treated with Kerosene & methyl alcohol good Deposit on carbons bulbs very little Discoloured very little blue on clamp

March 10 Summons # 69

2 lamps treated with amyl acetate & Kerosene very slow Deposit on carbons bulbs very little Discoloured blue will not work off of clamp

March 10 Summons # 70

2 lamps treated with naphtha & Kerosene good & quick Deposit on carbons bulbs very little very little blue on clamp

March 11 Summons # 71

2 lamps treated with Kerosene & amyl alcohol good Deposit on carbons bulbs very little Discoloured no blue on clamp

March 11 Summons # 72

2 lamps treated with Kerosene & amyl acetate very slow Deposit on carbons bulbs very little Discoloured blue on clamp

March 11 Summons # 73

2 lamps treated with naphtha and Kerosene quick Deposit on carbons no blue on clamp bulbs very little Discoloured

March 11 Emmons # 74

2 lamps treated with Kerosene & Gasoline very good Deposit on carbons no blue on clamps bulbs not Discoloured

March 11 Emmons # 75

2 lamps treated the same as 74 about same results

March 11 Emmons 76

2 lamps treated with ampl water & Kerosene slow Deposit on carbon bulbs very little Discoloured blue will not work off of clamps

March 11 Emmons 77

2 lamps treated with acetone & Kerosene slow Deposit on carbon blue hard to work off bulbs not Discoloured

March 12 Emmons 78

5 lamps treated with Gasoline & Kerosene good Deposit on carbons no blue on clamps bulbs not Discoloured

March 12 Emmons # 79

2 lamps treated with acetone & Kerosene slow Deposit on carbons blue will not work off of clamps bulbs not Discoloured

March 14 Emmons 80

10 lamps Duplicated of # 47

March 15 Emmons 81

10 lamps Duplicated of # 49 & 51

March 16 Emmons # 82

2 lamps treated with Gasoline Kerosene & Benzole good Deposit on carbons bulbs a little Discoloured blue works off of clamps very good

March 16 Emmons # 83

2 lamps treated same as # 82 about same results

March 16 Emmons 84

2 lamps treated with Benzine good & quick Deposit on carbons bulbs a little Discoloured ~~bulbs~~ blue works off of clamps

March 16 Summon # 83.

2 lamps treated with Naphtha good Deposit on carbons no blue on lamps bulbs not Discoloured

March 16 Summons # 86

2 lamps treated with the same as # 84 about same results

March 16 Summons # 87

2 lamps treated the same as # 85 about same results

March 16 Summons # 88

2 lamps treated with Gasolen & Naphtha good Deposit on carbons no blue on lamps bulbs very little Discoloured

March 17 Summons # 89

2 lamps treated the same as # 88 about same results

March 17 Summons # 90

2 lamps treated with Gasolen & Benzine good Deposit on carbons blue will not work off of lamps bulbs very little Discoloured

March 17 Summons # 91

2 lamps treated the same as # 90

March 17 Summons # 92

2 lamps treated with Kerosine & Gasolen good Deposit on carbons bulbs very little Discoloured blue hard to work off

March 17 Summons # 93

2 lamps treated with Naphtha & Kerosine good & quick Deposit on carbons bulbs not Discoloured blue will not work off

March 17 Summons # 94

2 lamps treated same as # 92 about same results

March 17 Summons # 95

2 lamps treated with same as # 93 about same results

March 18 Summons # 96

2 lamps treated with Benzine Kerosine & Naphtha good Deposit on carbons bulbs very little black blue will not work off of lamps

March 18 Emmons # 97

2 lamps treated with Gasolin Burgun & Kirosun very slow Deposit on carbons blue still not work off of lamps bulbs little Discolorated

March 19 Emmons # 98

4 lamps treated with same as # 96 about same results

March 22 Emmons # 99

10 lamps Duplicated of # 56

March 22 Emmons 100

10 lamps Duplicated of # 62

out of 1 Box March 23 Emmons 101

2 lamps treat with naphtha & Burgun to 7 7/4 volts before lamps are before treating 108 110 volts

out of 2 Box March 23 Emmons 102

2 lamps treated the same as # 101

out of Box 3 March 23 Emmons # 103

2 lamps treated the same as # 101

out of Box 4 March 23 Emmons # 104

2 lamps treated the same as # 101

March 24 Emmons 105

10 lamps Duplicated of # 67 & 70

March 24 Emmons 106

4 lamps treated with Burgun & Rigolen good Deposit on carbons blue not hard to work off bulbs not Discolorated

March 20 Emmons 107

4 lamps treated with Rigolen good Deposit on carbons no blue on lamps bulbs very little Discolorated

March 20 Emmons 108

4 lamps treated with Naphtha & Rigolen good Deposit on carbon blue on lamps bulbs not Discolorated

March 20 Emmons 109

2 lamps treated with Rigolen & Gasolin very slow Deposit on carbons no blue on lamps bulbs not Discolorated

March 25 Emmons 110

4 lamps treated with Rigolin & amyl acetate good & quick Deposit on carbons lamps a little blue bulbs not Discoloured

March 26 Emmons #111

4 lamps treated with Rhigolin & Benzole good Deposit on carbons bulbs little Discoloured blue wrotes off of clamps quick good

Box #1 March 28 Emmons #112

2 lamps 10 C 110 volts treated to 50 volts

Box #2 March 28 Emmons 113

2 10 C lamps this same as #112

Box #3 March 28 Emmons 114.

2 . 10 C lamps treated this same as #112

Box #4 March 28 Emmons 115

2 . 10 C lamps treated this same as #112

March 29 Emmons 116

4 lamps treated with 186 chemical quick good on carbons no blue on clamps bulbs not Discoloured

March 31 Emmons #117

10 lamps another Duplicate of #49

April 1st Emmons #118

10 lamps Duplicate of #88 & #89

April 2d Emmons 119

2 lamps treated with naphtha & Gasoline

April 4 Emmons 120

4 lamps treated with #194 chemical good results

April 4 Emmons #121

2 lamps treated with #193 chemical very slow Deposit on carbons blue on clamps bulbs not Discoloured

April 5 Emmons 122

4 lamps treated with # 189 Chemical Good Deposit on carbons bulbs not Discoloured blue while not work off of clamps

April 5 Emmons 123

4 lamps treated # 190 Chemical slow Deposit on carbons bulbs not Discoloured blue while not work off of clamps

April 5 Emmons 124

2 lamps treated with # 171 Chemical very slow blue on clamps bulbs not Discoloured

April 5 Emmons 125

4 lamps treated with # 178 Chemical good Deposit on carbon bulbs not Discoloured but blue on clamps

April 6 Emmons 126

4 lamps treated with # 188 Chemical very slow Deposit bulbs not Discoloured blue while not work off

April 11 Emmons # 127

2 lamps treated with # 208 Chemical very slow Deposit on carbons blue while not work off of clamps bulbs not Discoloured

April 11 Emmons # 128

2 lamps treated with Chemical # 202 quick good Deposit on carbon blue while not work off of clamps no Discoloured on bulbs

April 12 Emmons 129

2 lamps treated with # 211 Chemical good Deposit on carbon no blue on clamps bulbs not Discoloured

April 13 Emmons # 130

10 lamps Duplicate of # 2

April 14 Emmons 131

10 lamps same as # 180

April 16 Emmons 132

April 16 Emmons 183
4 lamps treated with # 222
Chemical good & quick Deposit
on carbons bulbs not Discoloured
only blue on clamps

April 16 Emmons 184
4 lamps treated with chemical
223 slow Deposit on carbons
blue on clamps & bulbs a little
Discoloured

April 16 Emmons 185
4 lamps treated with emulsion
Not treated too much very slow
Deposit on carbons blue on clamps
bulbs Discoloured

April 16 Emmons 186
2 lamps [illegible]

April 18 Emmons 187
2 lamps treated with Chemical
224 bulbs very black quick
good Deposit on carbons no blue
on clamps

April 18 Emmons 188
2 lamps treated with Chemical
226 bulbs very black
slow Deposit on carbons no
blue on clamps

April 22 Emmons 189
24 Deposited clamp lamps treated
with amyphor to about 48 volts
for Mr Jackson clamps much
better for treating but still Discol-
our bulbs a little

April 23 Emmons 140
2 lamps x x x

May 9/892 Emmons 141
4 lamps treated with #18
chemical from Harris good
& quick Deposit on carbons
bulbs very little Discoloured
blue quite hard to work off

May 24/892 Emmons 142
10 lamps treated with the new
amplion treatment O.K.

Emmons #145 May 25/892 Emmons 143
18 Lamps treated with amplion
then taken out & tied in cir
bulbs for Mr Jackson

May 26/892 Emmons 144
2 132 volt lamps treated down
to 50 volts with amplion

May 27/892 Emmons 145
10 Lamps treated with amplion
with high current

May 27/892 Emmons 146
10 lamps Duplicate of #142
broken by accident left stand

May 28/892 Emmons 147
30 Lamps for Mr Jackson treated
with amplion stamped out in lots
& new lamps amplion treated on

May 31/892 Emmons 148
10 lamps treated with ~~amplion~~ amplion gio of &
Quick & Dayoid

June 1/892 Emmons 149
10 lamps treated with amplion
treatment same as above

June 1/892 Emmons 150
10 lamps treated with amplion same
as #149 & #148

June 2/892 Emmons 151
10 lamps treated with amplion ~~[illegible]~~
two volts first treatment

June 3/892 Emmons 152
10 lamps treated with amplion same
as #151

June 4/892 Emmons 153
10 lamps treated with amplion same
as 151

June 9/892 Emmons 154
10 lamps treated amplion for Mr
Dzelins test

June 14/892 Summons 153

10 lamps treated with amylum
lamps removed and new tops &
new clamp mortar put on over
the old clamp

June 15/892 Summons 156

10 lamps treated the same as #
155

June 16/892 Summons 158

10 lamps treated the same as #155

[illegible] Summons 158

10 lamps treated the same as #157

June 17/892 Summons 159

10 lamps treated the same as #157

June 18/892 Summons 161

20 lamps treated with amylum &
new clamps put on for correction

June 20/892 Summons 161

10 lamps treated with XXV

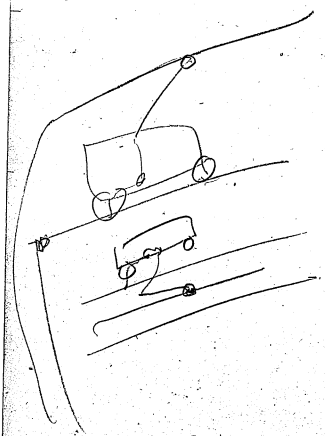
June 20/892 Summons 162

10 lamps treated same as #161

Notebook, N-92-04-28

This notebook covers the period April-May 1892. At the beginning of the book are 6 pages of undated drawings by Edison regarding the electric railway. The remainder of the book contains notes and drawings by John Ott and an unidentified experimenter relating to lamp tests. The pages are unnumbered. Approximately 30 pages have been used.

(× E-172) N-92-04-28



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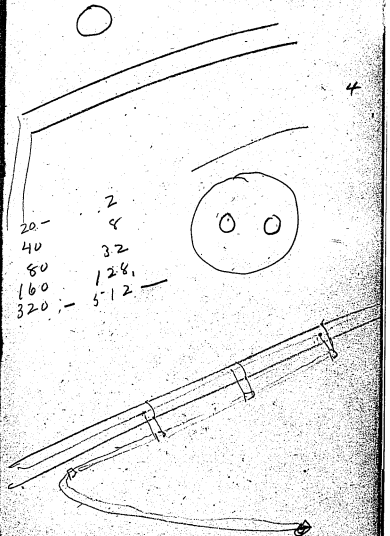
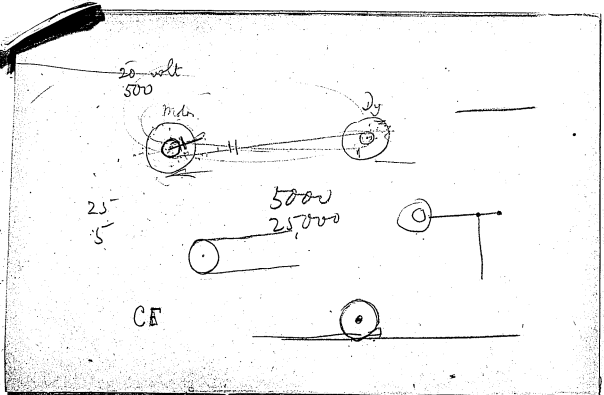
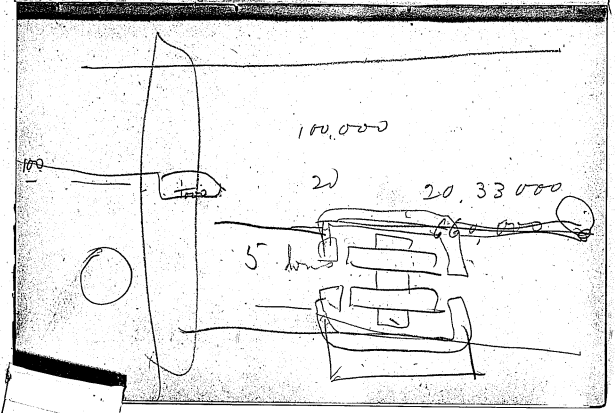
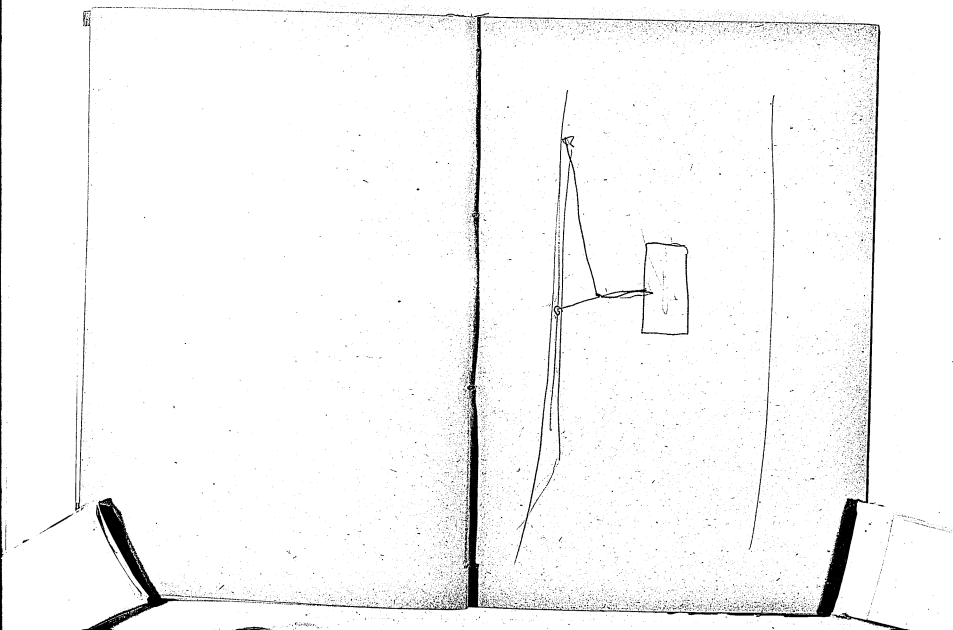
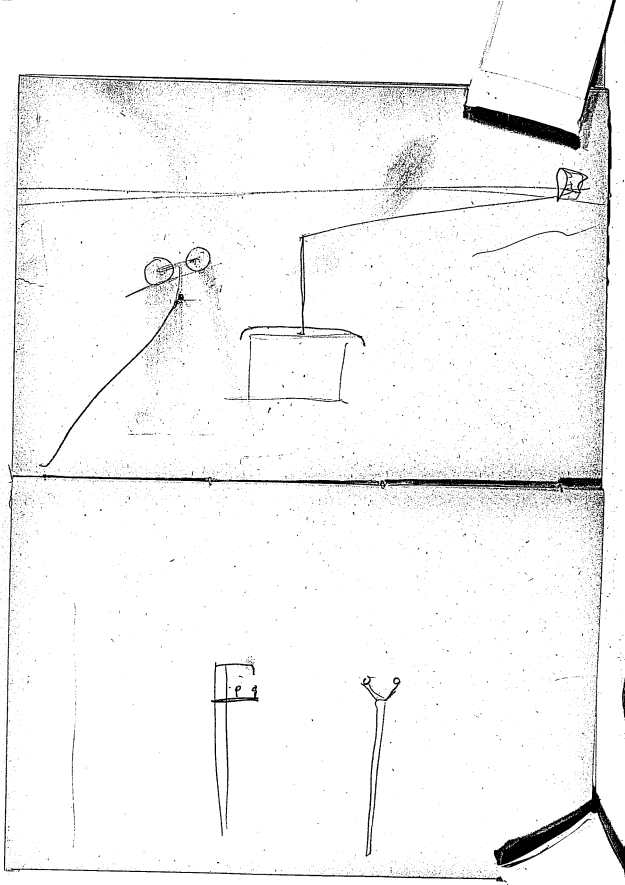


ΔM
γ=
2

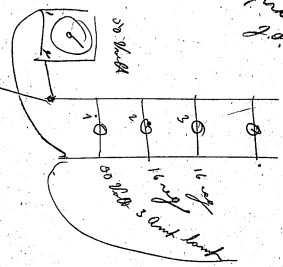

20 volt
500
25
5
5000
25,000
CE


100,000
100
20
20, 33 000
5

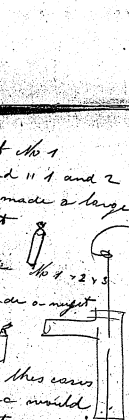




April 28
J. F. Osk. '92



First No 1
Second " 1 and 2
this made a large
night



in all these cases
the arc would
not stand
Changed the flow of gas
Changed the speed of motor

October 28.92

2 .50 Volt lamp
3 .16 reg "
Changed flowing of gas
" speed of motor
are both wounded
not motor
field
By reversing the
are the Dynamo
dropped 10 volts

2 .50 Volt are brake
4 .16 reg " "
3 .50 " " "
4 .16 " " "
3 .50 " " "
5 .16 " " "
4 .50 " " "
5 .16 " " "
4 .50 " " "
6 .16 " " "
8 .50 " " "
7 .16 " " "
2 .50 " " "
8 .16 " " "
1 .50 " " "
9 .16 " " "
Grate coal was taken to
change the flow of Gases, and
change speed of Motor
10 .16 " " "

Motive Force changed to 60 Volts

10	16	neg	arc	broke
1	16	"	"	"
1	50	Volt	"	"
1	50	"	"	"
2	16	neg	"	"
1	50	"	"	"
3	16	neg	"	"
2	50	"	"	"
3	16	neg	"	"
2	50	"	"	"
4	16	neg	"	"
2	50	"	"	"
5	16	"	"	"
2	50	"	"	"
6	16	"	"	"
2	50	"	"	"
7	16	"	"	"
2	50	"	"	"
8	16	"	"	"
3	50	"	"	"
7	16	"	"	"
4	50	Volt	arc	broke
6	16	"	"	"
5	50	"	"	"
5	16	"	"	"

Motive Force changed to 70 Volts

2	16	neg	arc	broke
1	50	Volts	"	"
3	16	"	"	"
1	50	"	"	"
2	50	"	"	"
3	16	"	"	"
2	50	"	"	"
4	16	"	"	"
3	50	"	"	"
5	16	"	"	"
3	50	"	"	"
6	16	"	"	"
2	50	"	"	"
7	16	"	"	"
2	50	"	"	"
8	16	"	"	"
9	50	"	"	"
1	50	"	"	"

Motor Power to 80 volts

2 . 16 volts are broken
1 . 5-0 " " "
3 . 16 " " "
1 . 5-0 " " "
5 . 16 " " "
1 . 5-0 " " "
7 . 16 " " "
1 . 5-0 " " "
9 . 16 " " "
1 . 5-0 " " "
8 . 16 " " "
2 . 5-0 " " "

Electromotive force to 90 volts

2 . 16 mg are broken

4 . 16 . are holds for about 2½ minutes
Carbons very thick

16
16
16
16
16
16

April 28/892 #1

4 amps assist lamps at 91 volts

April 28/892 #2

5 amps assist lamps at 91 volts

April 28/892 #3

2 amps 3 series lamps assist at 95 volts

April 28/892 #4

3 amps 3 series lamps assist at 95 volts

April 28/892 #5

3 amps 3 series lamps assist at 100 volts
Change of volts 1½ high volts arc

April 28/892

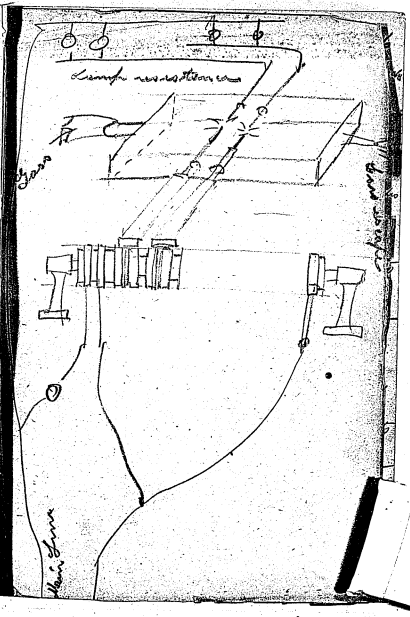
4 amps 3 series lamps will not hold arc at 100 volts

April 28/892

4 amps 3 series lamps will not hold arc at 100 volts

April 28/892 #6

2 amps 2 series lamps assist 100 volts without arc. volts arc 99 volts



April 29/892 #7

8 lamps in series 1 lamp in multiple
which not held are only for about 2 inches
motive Power at 105 volts, with arc
stands 106 volts, amperes from $\frac{8}{100}$ to $\frac{4}{100}$

April 29/892 #8

2 lamps in series 1 lamp in multiple
which not held are only for about 1/2 inches
motive Power at 106 volts without arc
stands at 105 volts with arc
amperes very unsteady run from $\frac{0}{100}$ to
$\frac{4\frac{1}{2}}{100}$

April 29/892 #9

2 lamps in series 2 lamps in multiple
which not held are only for about 2 in
motive Power at 106 volts without arc
with arc running from 98 to 103 volts
amperes run from $\frac{8}{100}$ to $\frac{0}{100}$

April 29/892 #10

3 lamps in series 1 multiple held are
for about 3" carbons very smooth
motive Power 110 volts without arc
with arc 111 volts amperes run from $\frac{8}{100}$
to $\frac{0}{100}$

April 29/892 #11

2 lamps in series 1 amph holds are for about 2 inches motive Power 110 volts without arc with arc 111 & 111½ volts amperes running from $\frac{2}{100}$ $\frac{2\frac{1}{2}}{100}$ to $\frac{3}{100}$

April 29/892 #12

2 lamps amph resist holds are for about 2½" motive Power 110 volts with out arc with arc 111¾ volts amperes running from $\frac{1\frac{1}{2}}{100}$ to $\frac{3}{100}$

April 29/892 #13

2 lamps amph 3 series resist holds are for about 3" motive power 115 volts without arc about same with arc amperes running from $\frac{2}{100}$ to $\frac{2}{100}$ + $\frac{3\frac{1}{4}}{100}$

April 29/892 #14

1 lamp amph 2 series resist holds are for about 2½" motive Force 114 volts no change with or without arc in volts amp running from $\frac{1\frac{1}{2}}{100}$ to $\frac{2}{100}$

April 29/892 #15

2 amph resist motive Force 114 volts with or without arc amp from $\frac{1}{100}$ to $\frac{2}{100}$

April 30/892 #16

1 lamp amph 3 series motive Force 121 volts with arc or without arc amperes running from $\frac{1\frac{1}{2}}{100}$ to $\frac{3}{100}$ holds are for about 2½" Carbon very smooth but quite some lamp black

April 30/892 #17

1 lamp amph 2 series motive Power 121 volts without arc with arc 122½ volts amperes running from $\frac{2}{100}$ to $\frac{3}{100}$ holds are for about 3"

April 30/892 #18

2 lamps amph resist motive Power 120 volts without arc with arc 122" amperes running from $\frac{1}{100}$ to $\frac{2\frac{1}{2}}{100}$ holds are for about 2½"

May 2 1892 #19

1 lamp multiple 3 series motor Power without arc 130 volts with arc 126 volts amperes running from 1/100 to 3/100. arc breaks about 1½"

May 2 1892 #20

1 lamp multiple 2 series motor Power 130 volts without arc with arc 125 volts amperes 3½/100 to 5½/100 holds arc for about 2½"

May 2 1892 #21

2 lamps multiple series motor Power 130 volts amperes running from 4/100 to 7/100 holds arc about 2½".

May 3 1892 #1 L

carbon made with 104 volts motor Force. 2.16 c lamps multiple series carbon cut 2⅝" each side. Exhausted measures at 16 c 64½ volts 91/100 of amp

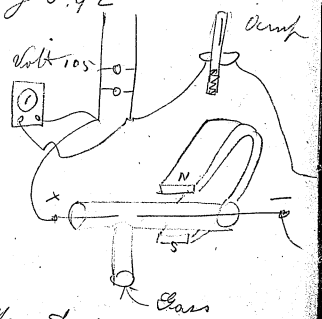
May 4 1892 #2 L

carbon made with 104 volts motor Force. 2.16 c lamps multiple series carbon cut 2½" long on each side run down on same then given one treatment measures at 16 c 51½ volts Point 90

May 4 1892 #3 L

carbon made with 104 volts motor Force. 2.16 c lamps multiple for series carbon cut 2½" each side then treated with one treatment of Benzine measures 54½ volts Point 104 at 16 c

May 5. 92



Magnets to stop vibration

May 9/892 # 4 L

Carbon made with 105 volts motive force 2.16 C lamp in multiple for moist cut of carbon 2½" each side measures 87 volts amp 1.10

May 9/892 # 5 L

carbons made & cut same as above measures 60 ¾ volts amps 1.15½

May 10/892 # 6 L

Carbons made & cut this same as above measures 6 2¼ volts 1.10 Point

May 16/892 # 7 L

Carbons cut 2½" each side made with 100 volts motive force thru lamp black burned off & lamps exhausted measure at 16 C

56¼	amp
33	"
86	"
	98½

May 21/892

4 lamps made with 100 volts motive force carbons cut 2½" each side. Then burnt off & exhausted measures at 16 c

volts	amps
57	.97½
57¼	.93
56½	.93
55	.98½

May 23/892

4 lamps made with carbons drawn through & alcohol flame one then exhausted first test as follows

	volts	amps
#1	59¼	1.01
" 2	59¾	1.01
" 3	58¾	1.00
" 4	59¼	1.02

cut of these carbons are 2½" each side

May 23/892

3 lamps made with painted carbons exhausted & drawn through the fire the 2d time cut of these carbons are 2½" each side

2d test as follows

	volts	amps
#1	57¼	.98¼
" 2	57¾	.99½
" 3	57½	.99¼

May 23/892

3 lamps made with painted carbons exhausted & drawn through the fire the 3d time cut of carbons 2½" each side

3d test as follows

	volts	amps
#1	57¼	.98
" 2	58¼	.98
" 3	58	.98

Notebook, N-92-05-06

This notebook, which covers the period May-October 1892, is a continuation of N-91-11-02.2. At the beginning of the book are notes and calculations by Arthur E. Kennelly and Alfred J. Thompson regarding conductor determinations for the Chicago electrical system, along with a note by Edison relating to the design and cost of the proposed system. The remainder of the book was used by Kennelly and Thompson as a rough record book in the Galvanometer Room. Included are notes, drawings, tables, and calculations concerning tests of batteries, low-horsepower motors, and an induction coil for phonoplex telegraphy. Transcriptions of the test records can be found in Arthur E. Kennelly Notebook #6. The front cover is labeled "Chicago III AJT." The pages are unnumbered. Approximately 180 pages have been used.

Only the material relating to the Chicago electrical system has been filmed.

xE-172 N-92-05-06

List of Catch Boxes,
with number of branches
already ~~[illegible]~~ feed from Box

All Catch ~~Boxes~~ ~~[illegible]~~ marked X are
for the service of opposed means only

36

Kg Cb	Brunch	Cost		Kg Cb	Brunch	Cost	
173	3	4	135	185	3	4	135
192	5	6	225	186	5	6	225
208	6	6	225	189	3	4	135
229	3	4	135	196	3	4	135
212	3	4	135	206	4	4	135
195	4	4	135	211	5	6	225
203	5	6	225	213	4	4	135
10	—	10	360	230	3	4	135
190	6	6	225	182	4	4	135
200	4	4	135	187	5	6	225
183	8	10	360	197	8	10	360
183	6	6	225	205	5	6	225
223	3	4	135	188	5	6	225
222	6	6	225	224	5	6	225
194	8	10	360	198	5	6	225
207	6	6	225	234	3	4	135
210	4	4	135				
17			36.00	16			30.15
			7				8

36

Kg Cb	Brunch	Cost		Kg Cb	Brunch	Cost	
212	4	4	135	201	8	10	360
182	6	6	225	202	6	6	225
232	3	4	135	215	5	6	225
227	4	4	135	216	7	10	360
199	7	10	360	219	4	4	135
204	4	4	135	5			1305
203	3	4	135	16			
221	5	6	225	16			1
225	5	6	225	17			
260	8	10	360	54	Cabb/Pacs		
228	3	4	135				
217	6	6	225				
218	3	4	135				
220	4	4	135				
181	6	6	225				54
226	6	6	225				
16			5.150				

35 #gCb	Brancher	Rate	Cost
233	4	4	135
238	6	6	225
108	9	10	360
108A	4	4	135
[illegible]	3	4	135
107	3	4	135
7[illegible]0	6	6	225
[illegible]	3	4	135
[illegible]	3	4	135
239	5	6	225
10		1845	
42			
231	3	4	135
940	6	6	225
941	9	10	360
942	5	10	360
4 Clones		(7)	1080

42 #gCb	Brancher	Rate	Cost
242	6	6	225
243	6	6	225
244	3	4	135
241	3	4	135
238	5	6	225
239	7	10	360
240	6	6	225
953	6	6	225
951	6	6	225
235	4	4	135
236	5	6	225
237	6	6	225
961	5	6	225
129	5	6	225
14			3015
18 Cutter Branches			

41 #gCb	Brancher	Rate	Cost
244	4	4	135
885	7	10	360
964	4	4	135
965	2	4	135
384	3	4	135
315	7	10	360
363	3	4	135
381	5	6	225
380	3	4	135
379	3	4	135
313	3	4	135
314	6	6	225
378	4	4	135
377	4	4	135
376	5	6	225
15 Catch Branches			2745
			(10)

49 #gCb	Brancher	Rate	Cost
899	3	4	135
48			
266	3	4	135
267	5	6	225
939	5	6	225
268	3	4	135
265	5	6	225
X264	3	4	135
X262	4	4	135
X262	5	6	225
261	3	4	135
X260	3	4	135
259	3	4	135
258	3	4	135
257	8	10	360
257A	5	6	225
14 C Branches			2700
			(9) 12

48

#CB	Branches	Cost
~~258~~	~~3~~	
~~259~~	~~3~~	
~~260~~	~~3~~	
256	8	10 360
255	3	4 135
312	5	6 225
254	9	10 360
253	3	4 135
252	8	10 360
X 251	3	4 135
250	5	6 225
X 249	5	6 225
X 248	3	4 135
245	6	6 225
X 246	3	4 135
X 247	4	4 135
311	3	4 135
14 Clubs		2925

47

#CB	Branches	Cost
1023	6	6 225
X 308	4	4 135
X 309	3	4 135
X 310	3	4 135
307	6	6 225
X 306	3	4 135
X 305	3	4 135
X 304	3	4 135
X 303	3	4 135
X 302	3	4 135
321	5	6 225
X 300	3	4 135
X 301	9	10 360
325	3	4 135
X 299	4	4 135
295	4	4 135
X 297	4	4 135
296	3	4 135
322	5	6 225
X 292	3	4 135
20 Clubs		3285

47

#CB	Branches	Cost
293	6	6 225
X 294	4	4 135
291	5	6 225
289	4	4 135
288	6	6 225
287	6	6 225
286	7	10 360
285	8	10 360
284	5	6 225
X 279	3	4 135
X 280	3	4 135
X 281	3	4 135
X 282	4	4 135
X 283	2	4 135
278	9	10 360
277	5	6 225
X 276	3	4 135
X 275	3	4 135
X 274	3	4 135
X 273	3	4 135
20 Clubs		3915

47

#CB	Branches	Cost
X 272	2	4 135
X 271	4	4 135
X 270	4	4 135
269	8	10 360
494	3	4 135
495	3	4 135
295	3	4 135
290	4	4 135
8 Clubs		1305
20		
20		
48		14
55		
894	3	4 135
1020	3	4 135
1021	3	4 135
998	3	4 135
895	2	4 135
896	2	4 135
890	4	4 135
892	4	4 135
8 Clubs		1080

55 Box No.	Bundles	Cost	
80[illegible]	3	4	135
80[illegible]		4	135
8[illegible]	3	4	135
88[illegible]	6	6	225
86[illegible]	4	4	135
X85[illegible]		4	135
8[illegible]	5	10	360
87A	3	4	135
850	10	10	360
809	3	4	135
1002	3	4	135
7[illegible]	3	4	135
12 Boxes			2160

54 Box No.	Bundles	Cost	
363	5	6	225
362	5	6	225
361	4	4	135
360	5	6	225
358	8	10	360
358A	4	4	135
350	4	4	135
317	5	6	225
316	5	6	225
9 Boxes			1890

54 Box No.	Bundles	Cost	
367	2	4	135
366	3	4	135
365	3	4	135
364	8	10	360
364A	6	6	225
5 Boxes		(13)	990

53 Box No.	Bundles	Cost	
X320	4	4	135
359	5	6	225
35[illegible]	3	4	135
X356	3	4	135
X354	4	4	135
X353	3	4	135
X352	3	4	135
7 Boxes		(a)	1035

53 Box No.	Bundles	Cost	
355	9	10	360
X351	4	4	135
X349	3	4	135
X348	3	4	135
X347	3	4	135
X346	4	4	135
X341	4	4	135
X342	3	4	135
X343	3	4	135
X340	4	4	135
X339	3	4	135
X338	3	4	135
X337	3	4	135
X336	3	4	135
X334	3	4	135
X335	3	4	135
X333	3	4	135
X332	5	6	225
X331	5	6	225
10 Boxes		(16)	2970

53 Box No.	Bundles	Cost	
1024	5	6	225
X330	5	6	225
X318	2	4	135
X319	5	6	225
X329	8	10	360
X328	3	4	135
X326	3	4	135
X327	5	6	225
8			1665
19			
34			
61			
970	4	4	135
976	2	4	135
973	3	4	135
966	3	4	135
4 Boxes		(9)	540
			246

60

Cases	Bruch		Cost
371	4	4	135
372	3	4	135
368	3	4	135
369	5	6	225
370	5	6	225
5 Cases			855

59

X446	4	4	135
X447	4	4	135
448	3	4	135
450	6	6	225
374	5	6	225
373	4	4	135
6 Cases			990

(7)

61

Cases	Bruch		Cost
977	3	4	135
978	3	4	135
859	1	4	135
989	4	4	135
1000	3	4	135
1000	8	10	360
1004	2	4	135
1003	6	6	225
1004	2	4	135
1002	5	6	225
1015	3	4	135
1016	3	4	135
1005	4	4	135
X1019	3	4	135
X1006	5	6	225
1007	8	10	360
1008	4	4	135
X1017	3	4	135
18 Cases			3150

(13) 68

62

Cases	Bruch		Cost
1018	5	6	225
388	3	4	135
375	6	6	225
1025	5	6	225
4 Cases			810

63

1026	5	6	225
457	6	6	225
X452	4	4	135
X453	4	4	135
4 Cases			720

41

(3)

52 740
13 " 6

(60)

855
36000
3015
3150
1305
1825
1080
3015
2745
2700
2925
3285
3915
1305
1080
2160
990
1890
1035
2970
1665
540
990
3150
810
720
[illegible]

4 tubs @ $135

		$
✓168 Bran @ $135 =		22,680 ✓
✓84 " @ $225 =		18900 ✓
✓31 " @ $360 =		11160 ✓
283	Total	52740 ✓

Present Bran, 4 tubs, = 95 @ $135 = 12825
6 " = 76 @ $225 = 17100
10 " = 20 @ $360 = 10440
Total Cutch Bran, present 200 $40365

Deferred Bran, 4 tubs = 73 @ $135 = 9855
6 " = 8 @ $225 = 1800
10 " = 2 @ $360 = 720
Total Cutch Bran Deferred 83 12375

X 73

168
135
840
504
168
22680

135
168
1080
810
135
22,680

225
82
450
1800
18450

52740
52290
450

225
82
450
1800
18450

360
31
360
1080
11160

360
31
360
10800
11160

225
84
900
1800
18900

360
31
360
10800
11160

225
84
900
1800
18900

415

225
135
360

225
168
1080
810
135
22680

360
31
360
10800
11160

360
31
360
10800
11160

52290
52290
52290

29 No.	Boxes	Jobber Price	Cost	30 No.	Boxes	Price	Cost
X110	4	2	135	166	5	6	225
			135	157	6	6	225
X127	2	2	135	X1220	5	6	225
126	4	2		138	2	2	135
133	5	6	225				
X158	3	2	135	172	3	2	135
124	5	6	225	161	4	2	135
123	4	2	135	116	3	2	135
125	4	2	135	137	5	6	225
117	7	10	360	120	5	6	225
X120	3	2	135	180	3	2	135
X121	3	2	135	160	3	4	135
X122	7	10	360	149	3	2	135
128	5	6	225	139	5	6	225
118	5	6	225	158	3	4	135
X119	3	2	135	148	4	4	135
15 Cases			2835	15 Cases			2565

30 No.	Boxes	Price	Cost	30 No.	Boxes	Price	Cost
145	3	4	135	157	3	4	135
156	5	6	225	152	3	4	135
168	3	4	135	179	2	4	135
159	2	4	135	162	2	4	135
147	3	2	135	141	2	4	135
135	2	4	135	153	3	2	135
136	4	4	135	175	3	2	135
164	2	2	135	155	2	2	135
167	8	10	360	142	6	6	225
178	5	6	225	177	2	2	135
144	5	6	225	176	5	6	225
143	7	10	360	174	3	4	135
134	10	10	360	12 Cases			1500
132	4	4	135				
165	4	4	135				
163	2	4	135				
16 Cases			3105				

100	6	6	225	111	5	6	225
8[illegible]	5	6	225	112	5	6	225
103	3	[illegible]	135	432	4	4	135
101	3	6	225	X 1[illegible]8	5	6	225
X 1[illegible]	3	4	135	113	4	4	135
5 Cases			945	114	3	4	135
				X 115	3	[illegible]	135
				X 110	5	6	225
				X 116	3	4	135
				106	6	6	225
				431	3	4	135
				430	5	6	225
				429	4	4	135
				427	[illegible]		
				14 Cases			2430

2835
2565
3105
[illegible]
945
2430
$ 13680

Present
39 Cases (4 bottles) @ $135 = 5265
20 " (6 bots) @ $225 = 4500
4 " (10 bots) @ $360 = 1440
63 11,205

Deferred
9 " (4 bots) @ $135 = 1215
4 " (6 bottles) @ $225 = 900
1 " (10 bots) @ $360 = 360
14 2,475
77 13,680
$ 5,775
66,420

#250 #300 #500 #750

12000	5861	3500	3800
15000	12412	1700	1613
11200	15156	1200	22413
500	7169	720	1613
8200	12236	10000	18556
1250	19849	830	12000
1100	14784	1350	2206
750	10436	950	1577
	124307	2200	2260
		6200	1151
		10500	2000
		750	32050
		1500	2206
		850	1364
		2200	2784
		1200	2658
		1500	2784
		2100	3895
		1250	2300
		2000	37124
		1770	3205
		850	16633
		430	7984
		400	6124
		320	3434
		1850	3434
		1100	2002
		900	1763
		950	1763
		1500	2784
		33510	62193

1700	3800	1550	5183
720	1613	720	3076
1500	40032	2700	4247
1050	12358	860	4243
720	16357	1500	5016
2000	26658	2000	3246
2000	41447	900	6685
500	20166	2000	4013
850	19494	1500	5016
2200	8925	1500	4624
1100	32400	500	5016
2200	26658	850	6156
870	19494	850	3216
750	3900	500	3216
1750	25764	530	2000
1550	5936	600	1770
2500	5736	1050	3511
3000	38000	775	2434
1250	38000	3250	1886
1970	63325	1370	4584
		12600	4234
		47875	59903

#1000 #1500 #2000

8950	35514	10100	66993
3500	38058	8700	66291
10700	42058	7200	49896
8300	32934	2300	50569
6300	24998	7300	29799
	149783	2200	38603
		2000	63963
		9100	47817
		6900	45739
		6600	62370
		9000	42273
		6100	44996
		7200	27365
		10500	658350
		95000	658350
			96

11200	90050		
11250	34500		
6050	34260		
2900	14260		
1700	89880		
1700	32760		
3900	18480		
2300	47000		
5500	466200		

add.

38000 (5 cents) @ 14.00 ~~[illegible]~~ 53200

55500
95000
37750
47845
26270
33510
9250
30 7125

658250
693
1944260
5944500
39449 6250
45621 13
19 10
26 26
8
102 74

0.9 × 0.785
0.625

2000

#	$
11200	94680 ✓
11250	94500 ✓
6050	50820 ✓
2900	24360 ✓
1700	14280 ✓
10700	89880 ✓
3900	32760 ✓
2200	26400 ✓
5600	47040 ✓
	474120

8400
45000
896000
9408000

11250
840
450000
00000
945,000.00

6050
840
24200.00
48400
508200.00

2900
840
116000
23200
2436000

1700
840
68000
13600
1428000

10700
840
4280000
856000
8988000

3900
840
1560000
31200
3276000

693
8700
4851
5544
60291

693
7200
1386
4851
49896

693
7300
2079
4851
50589

693
43
2079
2772
29799

693
920
13860

2200
840
1848000
176000
26400

5600
840
2240000
448000
4704000

693
10100
693
6237
630637

693
10700
693
69300
6993000

693
69
6237
4158
47817

5500
840
2220000
44000
4662

3968
8300
11904.00
31744
5293 4200

3968
6300
11904.00
23805
24998.400

37750
3968
37750
198400
27776
27776
11904
14979 2000

3968
8950
198400
35712
31744
35513600

3968
10750
27776000
30688
42457600

55500
840
22200000
44400000
4662 3

~~95000~~

693
95000
34665
62370
65835

693
66
4158
4158
45738

693
90
62370

693
61
693
4158
42273

693
72
1386
4851
49896

693
105
3465
693
72765

3968
3500
198400
11904
13852

Test of Storage battery transformer

Current in Charging circuit (Marg 6th 1912)
Pressure on Charging circuit 2·75 amp
" " " " 123 volts

Current in " " 21·5 Volts
" " " 1·5 (Black)

The transformer has ~~the~~ three branches which are connected to a series of 9 cells each.

Storage 1600 AMH

Secondary = 5 amp
12 volts

Primary = 123 Volts
2·7 amp

123
225
615
246
246
27675

21·5
225
1075
215
3225

123
27
861
246
3321

21·5
7·5
1075
1505
161·25

382 | 6000 | 18
3321
26790
2568

Small Square Cell — Lead-p.

Type & Cell 4

Small Screw-Cap N

~~Full Circular~~ L

Charging Circuit	Volts	Amps
	119	1

Discharging Circuit	Volts	Amps
	2·5	3·3

Weight of Lead Plates

after Immersion Bray 12 2 1892

1 P = 12·877	11 P = 12·780
2 P = 13·200 (Oxidation queerly)	12 P = 13·160
3 P = 12·950	13 P = 13·172
4 P = 13·220	14 P = 13·127
5 P = 13·210	15 P = 12·680
6 P = 12·885	16 P = 13·210
7 P = 13·305	17 P = 12·665
8 P = 12·965	18 P = 12·955
9 P = 13·375	19 P = 12·800
10 P = 13·343	20 P = 13·435

1 A = 22·785	11 A = 25·100
2 A = 20·955	12 A = 23·995
3 A = 21·745	13 A = 21·597
4 A = 22·435	14 A = 21·050
5 A = 22·735	15 A = 21·750
6 A = 22·620	16 A = 22·040
7 A = 22·647	17 A = 24·925
8 A = 24·402 (heavily coated)	18 A = 25·427
9 A = 21·300	19 A = 26·565
10 A = 24·940	20 A = 25·365

May 15 1889 Weight of Lead & Spelter Castings

41	= 22.872	Solder	
41	= 27.320	Lead	
41 A	= 12.167	Solder	
41 A	= 16.585	Lead	26.585 ?.
42	= 16.525	Solder	
42	= 25.920	Lead	
42 A	= 7.630	Solder	
42 A	= 29.095	Lead	

21 P	13.005	24 P	13.020
22 P	13.005	25 P	12.765
23 P	13.247	26 P	12.965

100 P	= 15.817	109 P	= 12.707
101 P	= 15.432	110 P	= 16.412
102 P	= 17.630	111 P	= 17.552
103 P	= 15.890	112 P	= 15.780
104 P	= 18.005	113 P	= 13.020
105 P	= 17.765	114 P	= 17.280
106 P	= 15.725	115 P	= 17.670
107 P	= 16.970	116 P	= 16.310
108 P	= 16.535	117 P	= 12.650
		118 P	= 15.850

119 P	= 17.465
120 P	= 16.680
121 P	= 17.130
122 P	= 18.280
123 P	= 17.020
124 P	= 19.977

May 14 '89

135 P	= 16.437	P 142	= 16.675
136 P	= 16.740	P 143	= 16.755
137 P	= 16.585	P 144	= 16.620
138 P	= 16.690	P 145	= 16.685
139 P	= 16.825	146	= 15.775
140 P	= 16.647	147	= 16.025
141 P	= 16.670		

130 volt Gen Motor 1/12 HP

Obrich .069 Speed 1320 RPM

507 volt Gen Motor 465 V

" .030 Speed 1385 RPM

Test of Cable Knots

11	=	13·66 w
13		13·65
1		13·61
3		13·740
5		13·53½
7		13·710
9		13·69

4·61
·66
·32
13·34

12·4·9 w
50·3

2645
966
3681

Don't think plan is good one as the Cost of feeder will be heavy & unsuitable afterwards & the Municipal will be too small for regular work afterwards - Church tells me that they have ample room for 2 more boilers and I have suggested to Gorton to replace some of the small Engines by double larger Engines - The double Engine will stop vibration - They are very much in fear of an injunction & don't appear to be afraid of not being able to take care of the load - Without you put in some double cylinder Engines so they will balance I think you will get an injunction on you -

The smallest expense will be to do this & use the old Engines in your Tenderloin District Station.

Edison

Notebook, N-92-09-08

This notebook covers the period September 1892-March 1893. There is also one entry near the end of the book dated March 1892 [1893?]. The book was used by Joseph W. Harris primarily for notes regarding the electrolytic separation of iron ore and the bricking of ore concentrate. Also included are notes relating to routine chemical analyses, including assays of the stearic acid used in phonograph cylinders. The front cover is labeled "Experimental Notes & etc. J.W.H." The book contains 191 numbered pages and has been used in both directions.

Only the ore separation and bricking material has been filmed.

Filming order: 26-59, 66-73, 102-109, 167-126.

Nov. 22 - 1892

I am testing of my Oxide Cincin[illegible]
[illegible] ground to
the shape of a cone and placed
in a crucible filled with charcoal
[illegible]
[illegible]
[illegible]

[illegible] turned on [illegible]

[illegible] (same lot)

[illegible]

[illegible] 100 lbs

with bright red heat.

[illegible] their [illegible] next morning

[illegible] on the surface.

Turned [illegible] with gasolene gas

[illegible]

started 1.30

Expt with gasolene & [illegible]

Placed [illegible]

[illegible] on boat with [illegible]

& passed air through [illegible]

became red hot.

Started 2.15

stopped 4.45

2.30

No. 1

hydrogen

Ogden 29.5 grams 24.2 grams

Hemalite 18.5 (broken) 18.800 "

Granular 33.5 " (broken) 25.900

Crystalline 30.2 " 27.850

at 2.15 Ches as follows Ogden, Hemalite, Granular, Crystalline

Stopped 6.10

Ogden Exp. with Ogden Cr.

Crystalline, Hemalite, Granular

Crystalline

Granular. No - 2

Started 20 cc of H_2O_2 has given off

	before	after
Ogden	44.400 grams	33.700
Hemalite	44.900 "	39.700

Started at 10.00 Am.

stopped " 12.00 M.

Ogden first

Duplicate Expt. No. 3 with ores
using hydrogen for
short time of 1/2 hour.

	before	after	%
Ogden	21.900 grams.	18.5 grams	15.5
Hematite	21.800 "	19.3 "	9%

started 4.35
stopped 5.10

Ogden the reduced copper all through, Hematite did not reduce any.
Ogden first.

No. 4
Expt with Ogden & Crystaline ores.

	before	after 12.00 reduc.	%
Ogden	23.5 grams	19.5 grams	17.0
Crystaline	25.2 grams	23.3 "	7.6

started 10.20
stopped 10.35
on opening, found that ores had

not been reduced.
started test again at
11.45
12.00
Ogden ore reduced copper solution throughout, while the crystaline ore reduced in the surface.
Crystaline first.

Dec. 8th No. 5
Expt with samples of 4 ores

		after 1.40 solids being	
Ogden	35.5 grams.	32.5 grams	8%
Hematite	34.0 "	broken	
Granular	36.0 "	34.6	12%
Crystaline	35.2 "	31.8	9.7%

started 9.27 am
stopped at 10.00 "
after cooling, ore taken out, it was found that all had not been reduced
started again at 1.10
stopped at 1.40
Order of ores in tube,
Granular, Crystaline, Hematite, Ogden.

No - 6

Test with Ogden + Brandenberg
Brandenberg first.

Brandenberg	19.0 grams	17.3 grams	9%
Ogden	16.7 grams	14.7 grams	13%

Started at 4.15
stopped " 4.45

No. 7

Test with Ogden + Hematite
Hematite first.

		Ogden	% loss
	19.7	21.9	24 -
	19.6 "	18.9 (broken)	36
started	9.10		
stopped	9.40		

8

4 samples, 2 Ogden, 2 Hematite, treated with CO, from inside burner.
Samples alternate, thus

#1 Ogden	16.4	$\boxed{M^1}$	$\boxed{H^1}$
#2 "	18.7		
#1 Hematite	10.55	$\boxed{H^2}$	$\boxed{M^2}$
#2 "	13.05		

started 1.15 with CO at a dull red heat
stopped 2.45

9 Reduced in Hydrogen (35)

Test with 4 pieces Ogden, 4 pieces Hematite, placed thus

$\boxed{H^1}$	$\boxed{M^1}$
$\boxed{M^2}$	$\boxed{H^2}$
$\boxed{H^3}$	$\boxed{M^3}$
$\boxed{M^4}$	$\boxed{H^4}$

H - Hematite
M - Magnetite - Ogden
Treated at a dull red heat

started at 1-40 — 1-40
stopped 3.45 — 4-30
started 9 15
stopped 10 00

H -				
1 -	19.9 -	broken		
2 -	21.6	17.5	- - -	loss 20.6%
3 "	16.9	broken - 13.4	- - - "	20.7
4 -	23.7	19.9	- - - "	16%
M -				
1 -	19.5	16.6	- - -	14.9
2	17.25	15.6	- - -	9.6
3	18.05	16.55	- - -	8.9
4	20.3-8.7		- - -	7.9

started 10.15
stopped 10.45

started again 1 30
stopped at 2.00
started 4 35
stopped 5 15

Qualitative determination of [illegible] of steel [illegible]

[illegible] K

[illegible] HCl, [illegible]

[illegible] which [illegible] the [illegible]

H_2 [illegible]

$(NH_4)_2$ [illegible] produces [illegible]

[illegible], [illegible] produces no [illegible]

Contains	does not contain
Iron	ni
Tungsten	Co
Phosphorus	ti

(97)

Quantitative determination of tungsten in alloy steel

Weight of sample, 3.423 grams

digested in HNO_3 + [illegible]

10

Samples of lens, treated with CO gas, fumigated, as in # 9 –

M –			Ext
1	17.1	16.5	3.5 %
2	16.45	16.0	3.4 %
3	18.45	17.8	3.6 %
4	18.6	18.15	3.5 %

H –			
1	26.6		
2	32.45	20.3	37.4 (?)
3	15.45	13.8	10.7
4	17.1	15.5	9.4

Started 8-50-

stopped 11-50

11

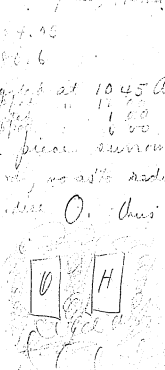
Iron Sample, Hematite + Magnetite

C – 14.05

H – 0.6

started at 10 45 Am –
stopped " 11 45
started " 1 00
stopped " 6 00

Cold – piece surrounded by charcoal, no air to reduce CO_2 + Oxidize O. Chars



started again 245

Red heat –

On removing [illegible] formed that Hematite had been changed to magnetite while magnetite remained unchanged.

Tried cooling with charcoal + passing air through.

furnace slag
1.25

Experiments are looking to be made in the following proportions (48)

62 lbs Resin
90 lbs water
5½ lbs Calcined soda ash

after clean, dilute with 150 lbs water, & stir till clean.

work

124 grams Resin
150 " H_2O
11 " Na_2O.
300 " H_2O extra

2

124 Rosin
150 H_2O
14 Soda

300 grams H_2O extra

3

124 Rosin
150 H_2O
11 Soda

150 grams H_2O extra

4

62. Rosin
150. H_2O
11 Soda
150 H_2O [illegible]

5

124 Rosin
180 water
11 Soda
150 H_2O [illegible]

6

22 grams Calcium Chloride fused
124 " Potash
100 " H_2O
150 " H_2O water
11 " Soda

---

grams #7
64 five hundred Potash
5 1/2 grams fused Soda
90 cc. water,

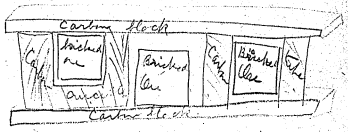
after all combined, & still boiling
add gradually, 80 cc H_2O.
Weight of total mass & can 960 grams
" " can 462 "
498 " mass
used 3-min quantity of material
718.5 grams.
496.0
220.5

Jan 3 - 189 -

(47)

Experiment on reducing Oxygen liberated on, in presence of carbon only,

3 pieces of ore tried, as follows



Around carbon block, was placed some powdered carbon.

heated to a yellow heat

for 3 hours, at end of that time not any had been reduced but it appears as if it would have reduced if heated for, say, 10 hours.

Experiment on reducing Ilydine
liquid Concentrated, + a piece of hematite
in Hydrogen gas.

	before	after	lost
Ilydine	45.8	41.4	lost 9.6%
Hematite	37.6	34.0	" 9.6%

placed side by side

started at 11.00 am
stopped " 12.00 "
Cooled in an atmosphere of
Coal gas
Hematite reduced to magnetite
Stilles again. at 2.45
stopped at 4.45

			lost
O-	41.4	37.250	10%
H-	34.0	32.1	5.6%

H 8 much.
in H 7 repeated.

64 fine rosin
5½ Soda
90 cc H_2O.

+ after all combined,
80 cc H_2O

Weight of clean dish, in which
material will be made, 303 grams.
after dissolving soda in the water
dish, water + soda weighed 399.5 grams
(probably added 91 cc H_2O, instead of 90)
Weight after adding rosin, + com-
bining same 418.5 grams.
after adding 80 cc H_2O extra = 492 g
Total weight of material, 239.5
Loss 90 = 21 %
Loss in adding the 80 cc H_2O, 7.5 %

9 –

1150 cc H_2O
64 grams Rosin
5% Soda
+ 86 cc H_2O extra

Weight of dish 312 grams.
" " " water & Soda 432.5 "

after extra H_2O added 532

afterwards, added, 19 cc. = 546.5
5 cc = 551 grms.

Total cc H_2O added
115
86
24
225 cc.

1154 110

In using standard solution of soda (172.5 grams Soda, + 402.5 cc H_2O) 112 cc = 120.15 grams.
(This is due to the contraction the water undergoes, by adding soda)
Therefore
112 cc Std Soda Sol.
64 Rosin
110 H_2O extra.

#10

Experiment to determine the necessary quantity of Soda solution to assume, for causing the precipitation reaction.

49.5 cc Soda Sol
32 Resin
5.5 H_2O extra
5.5 cc Soda Sol (10%)

#11

47 cc Soda Sol
32 Resin
5.5 H_2O extra
8 Soda Sol (15%)

12

44 [illegible] Soda Sol
32 Room
55 H_2O Extra
11 ce Soda Sol (10%)

13

41 ce Soda Sol.
32 Room
55 H_2O extra
14 ce Soda Sol. (25%)

14

38.5 cc Soda Sol
32 Rosin
55 H_2O [illegible]
16.5 cc Soda Sol (20%)

15

(57)

115 H_2O
6 Soda
64 Rosin
110 H_2O
(20% Soda Sol reserved)

When soda was dissolved in the 115 cc H_2O, its volume was measured, = 113 cc.

Sp. G. of resinate, at 150° F, showed to be 1.035 Baume

June 11th

[illegible]

[illegible]

[illegible]

Opal 44.050 gam 35.1 20%
[illegible] 33.2 25%

Pumps [illegible]
Starter -30
diff. b 12.00
starter 2.50
diff. 3.00

Sprinkler system want [illegible] +
[illegible] repaired.

59

To HCl sol. of metals, BaCl gives a very faint crystalline ppt, which increases [illegible] of [illegible]

Examination of a solution of Oxyhydrogen magnetic iron ore, for all elements.

Dissolved 500 grams ore in HCl + HNO_3 diluted a portion, added H_2S in excess, gave ppt of sulphur, seemed also to give arsenic, + after considerable H_2S had been added a very deep blue color was produced which disappeared this time not considerably.

Dissolved ppt of Sulphur + [illegible] in HNO_3

Catania

[illegible]	iron
[illegible]	arsenic
Germanium	Aluminum
Germin	Phos.
Zinc	Sulphur
antimony	silica
	Cobalt
Manganese	nickel
[illegible]	vanadium
	Calcium
	trace titanium
	trace tungsten

fused 10 grams ogden ore with Sodium Carbonate + a little Sodium Nitrate in pt. Crucible for vanadium + dissolved fused mass in H_2O, filtered, used filter for determination of Ni + Co.

Pt Crucible, weight	22.777 grams
" " " " Ni + Co	22.798 "
	.021 "
Paper	.001 "
	.00.020 "
	78.57
	00.15714

= 0.1577% of Ni + Co

22.777
22.783
.006 grams
.56.16
.33696 = 0.0336967%
vanadium

analysis of a copper ore, found at ~~Bodtrum~~, Bodtrum, by Mr. Burn

5 grams used = 1.92 % Cu,

57.7 cc
72.5
20.8
1.2
79.6 cc
4.897
29382
40073
4897
5 | 95982 mg
1.92
5000
92
30000
45000
48.0000

Test of ore mixing machine, (71)

Mixer slowly about 35 revs. per min. and 50 lbs ore, regular muck, 70 lbs per long ton, left about 7 minutes to all to pass through, after all had passed, mixture weighed 110 lbs. mixture well sieved, & balls weighed = 6 oz.

Test on Feb - 8th 1892

Machine geared up. 225 lbs ore put in, with muck this, practically, is the limit of this machine it made a layer of about 2½" all along the bottom & had the effect of mixing under pressure, as one particle of ore would grind against all others. Speed 26 revs per minute. sieved a portion gave no balls, only hard pieces which

was fast to the machine, & large grains of sand, remained.

Experiments on making Resinate of Soda with Carbonate of Soda, & Calcium Hydrate,

1 part Na_2O = 1.7 parts Na_2CO_3

1.7 parts Na_2CO_3 require 1.19 parts $Ca(OH)_2$

to deliquate 1 part Na_2O

1.7) 5.0 (5 3
85
50

Experiments on mixing oil.

#1

Burning Oil –

15 lbs – oil

30 " Rosin –

mixed first –

Oil hot about 225° –

mixed very well – all night

#2 –

Lima Oil –

15 lbs oil

30 " Rosin – mixed first

Oil hot – about 200

mixed in machine all night

3

12 lbs Lima Chl
30 " Rosin
mixed fusil —
Che cold —
did not mix at all

4

12 lbs Lima Chl
30 lbs Rosin
Mixed fusil
Close at 120°F
did not mix very well —

#5

15 lbs Lima Oil
30 " Rosin
" mixed first
Chro acid -
no good

#6

12 lbs lima Oil
30 " Rosin
mixed first
Chromat 150°F -
mixed very well, perfectly satisfactory

Examination of Rosin for Acids.

Sample of very transparent yellow rosin, probably G or H used as standard. 2 grams weighed and dissolved in alcohol and neutralized by a solution of NaOH+H_2O = 20.0 cc. or 100%

Sample of regular B rosin 2 grams used & neutralized by same NaOH solution = 19.3 cc = 96.5 %

Sample of Dross Rosin, 2 grams used & neutralized by same NaOH solution = 17.7 cc, or 88.5 %

Or, using B Rosin as standard,
B = 100 %
Dross Rosin = 91.7 %
Residue in Dross rosin (2 grams) = 0.1349 gm
= 12.7 % + 88.5 % = 101.2 %

#18 2'8"

Round bottom flat top —
packed mould
2 blows.
broken around bottom only
rapped sides

#19 2'8"

Same as #18.
3 blows
rapped sides —
broken around bottom

#17 2'8"

Packed mould —
1 ~~drop~~ blow —
Round bottom, flat top
rapped sides.
Broken across bottom

#21 2'p4

pieces placed top & bottom
but crossed

1" cake

2 flours

sides rapped

split across bottom

#20 2'p4

pieces placed top & bottom
are not packed

3 pieces top

4 " bottom

1 flour

rapped sides

pieces in same direction

cake was very weak

1" cake

x means top piece

23 2'8"

same as 22, but are rammed -
3 blows
top end broken
bottom end also broken

22 2'8" (103)

same as # 21, but 3 blows

1 3/8" from top of form to top of mould before hammering,
after hammering, distance is 11/16"

depth of cake after compression 2"
broke across top end

25 3'

Height raised from 2'8" to 3 feet

flat bottom & top

oiled rammed

3 blows

very good brick

24 2' 8"

(161)

Round tops & bottom

rammed mould - with small ram rod

3 blows

rapped mould

broke both ends

#27 3'

flat top stile

3 bars —

brick of earth; thickness

not rammed.

split across bottom

#26, 3' 1/4" = 7/16"

(N9)

flat top stile

3 bars — mould not rammed

split across the top

stile

29

Mould with pieces crossed without ramming —

3 blows —

Mould rapped

split across top & bottom

28

same as #27, but mould rammed — 3 blows —

mould rapped —

split across bottom

H 31

flat top letter
5 blows mould rammed
Ridge rapped
Opened on bottom

H 30

(155)

Same as 29
with mould rammed
3 blows
Opened on top

33

Mould filled to top, not rammed

corner ends to mould,

3 Hours. Thick brick .3" coke

separated on top -

rapped mould

32

3 Hours

flat top + bottom

paper on top, bottom, + sides

to find out if air escaping to mould

as cause of splitting.

Mould rapped -

split across bottom - & top.

35

flat bottom flat top with holes at top –
3 flues –
rapped mould 1" brick
split around top, but line in
cake around bottom

34

(157)

same as 33 but not so much
oil 3 flues 1" cake
rapped mould –
broken around the bottom –

37 -

small cast iron mould with plunger, filled up, I drop, broke all to pieces on removing - too much of a blow -

#36 (149)

same as 35, with one rammed - 3 blows - 1" cake split on top, + had line ~~around~~ around the bottom -

H 39 –

duplicate of 38

Split around the lips –

H 38

(147)

same as H 37 with small dup. hammer.

Split around the lips –

#41

Same as 40, under heavy hammer. 1 blow – remoulded.

Split across mould.

#40 –

Same as 39, with reversed plunger better than 39, but ~~[illegible]~~ split across middle –

2 blows –

43 –

large mould with convex ends –

hairy mixed in one.

3 blows –

separated at both ends but hairy held it together –

on removing it, fell apart

42 –

(N3)

large mould –

1 blow –

flat bottom + top – top with holes

split across top

with line across bottom

45.

same as 44 –
5 blows –
separated & cracked all up –

###

(14)

same as 43 – with 1 blow –
split across top, line across
bottom, worse than 43 –
very bad

47 -

very large vase flat ends
holes at the bottom, large
quantity of hay -
3 glass - vase 2 1/2"
cracked across top -
4 letter, rall over

46 -

(139)

large mould - 3 glass -
used hay -
flat ends holes in top -
cracked across top

49 –

flat ends, holes at bottom, 3 thus –

mould held still by hand

[illegible] in crack

48 –

same as 47, with lines bay – 3 thus –

split across top, lines all through –

51 –

Cancos 50 – 1 Bl.

split cans tip –

~~[illegible]~~ tip 1

[illegible]

50 –

(135)

Cancos 49 – with less

oil – 3 blue

split cans tip –

53 –

Samcas 3 2
longer lines, &
more work
3 letters –

52 –

Samcas 51 – with one
hemmed – 3 lines –

55

very thin Boots
wt one —

54

(131)

2 Horse Thin boots
very good —

57 -

Convex ends

2 lines -

wet air

hard in centre

soft outside

Split across the middle

no lines.

56

(119)

2 small ends

1 blem -

wet air

59

flat ends, thin one,
2 blas, bay mixed
with wet one
split across top –
4 all round.

58 –

flat ends. holes at the
bottom 2 blas –
very good

(171)

Notebook, N-92-09-28

This notebook contains dated entries from September 1892. It was used by John Ott for notes and drawings regarding magnetic ore separation experiments. The spine is labeled "134." The book contains 15 numbered pages. Several pages were removed before the book was paginated.

Blank pages not filmed: 1, 14-15.

Sept 28 92

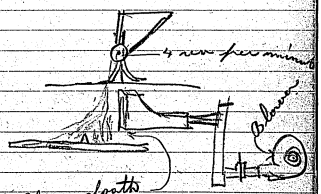
(3)

Edison Laboratory
Orange
N.J.

Sept 30 92

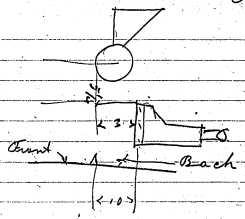
Experiment to separate Magnetic Ore that came from the first Mill at Ogden from the dust

The following was the Machine



Sept 28. 92.

(5)



Found that the Ore contained large sand and small the large sand was heavier or so heavy as most of the magnetic and therefore would fall back among the magnetic, the light magnetic would blow over with the light sand or dust.

Weighed out the diff. fractions, and

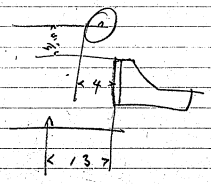
Sept 28.92

(7)

found the following

Sand	Magnetic
4.500 M.D.	25.420

Second

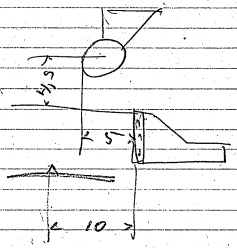


Sand	Mag
2.660	17.394

Feb 28.92

(9)

Shield



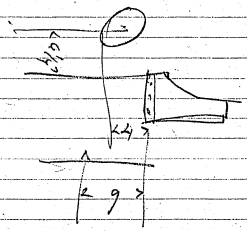
Cund
2.414

Mag
16 800

Sept 28.92

(11)

Fourth



Land	Mag
2.640	11.380

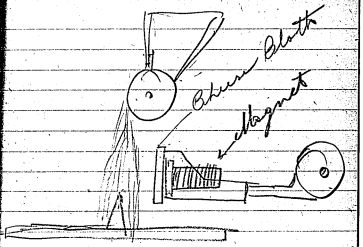
~~Weighed one lot~~

as we received it, it had,

Land 4.060 Mag 15.430

This shows that half the sand is taken out but we have a lot finer magnetic the same time I should judge about the same amount of not more than what we take out of sand

(13) Oct 30 92



Notebook, N-93-04-05

This notebook covers the period April-October 1893. It was used primarily by an unidentified experimenter, probably Joseph W. Harris, for notes and calculations regarding the bricking of iron ore concentrate, ore assays, and other chemical analyses. There are also notes, drawings, and calculations by Edison regarding ore separation experiments. The pages are unnumbered. Approximately 90 pages have been used.

N-93-04-05

XE-172

7.05
25
4
11.30 705

70L 705
425
1130

705

4.30
30
500.
14 125

14
11.30
14
11.30
10.30
21.00
3 20

5
11.35
10 35
10 35
37.45

3

11

/ 10 35
30

3

105 / 74.0 5

53

2
2.10
52
2.6 74 5

105
171
735
105
17.85
53
78.38

11 40
15 35
10 30
14 05
14 05
14 05
105 05
20
21 00

6.250

April 3 - 1893

Assay of copper wire for estimating purity & weight in Blanchette's f.p.

Standard Solution of KCN solution

Price of C.P. Copper, washing 30.5 mg, dissolved in HNO_3 (NH_4OH) added, and titrated with KCN.

8.5 cc - 212.5 cc - 2000 cc

6.2 cc - 74.9 - 12.7 cc = 2000 cc of cupric tetrammine

1 cc KCN = 0.757 mg. cu.

3 grams of well ground & mixed sample digested in HNO_3

Platinum crucible weighs 22.5071 grams
" " + CuO " 22.8100 "
CuO weighs 0.3029 grams
contains 79.85 % of cu
which is 4.84 % cu in m

~~43.2 cc = 36.5 mg cu~~

~~[illegible] = 000 0.106~~

.104 : 30.29
79.85
151.45
242.52
272.61
41.03
.2418.5765 : 242 mg

50 mg = 1%
50 | 241.8765 (4.83)
200
418 4.84
400
18.8
150
367

Redetermination of Cu in Schuyler mine dus, by electrolysis

5 grams used, digested in HNO_3, silica residue treated with H_2SO_4 + HFl to drive off any copper silicate that might be formed. After evaporated till all HFl had been expelled, balance added to make solution. Filtered, made neut. with NH_4OH, HCl added. Treated with H_2S for washing. Digested in HNO_3 + H_2SO_4, heated until all HNO_3 had been expelled + H_2SO_4 solution was nearly dry. Diluted Cu SO_4 in H_2O & heated. Electrolysis with about 1/4 amp. for 24 hrs. (Amount of current passed later)

Pt cathode weighs 5.699 grams
9 mg. cu
14 mg. cu
3
7

April 8th 1893
Assay of Stearic Acid
for W. H. Mullen

1 gram used.
13.9 cc
25.1 cc
11.2 cc
.1
11.1 cc 1 cc = 0.080319 grams
11.1
80319
80319
80319
.89.25409

= 89.25% pure

April 17th 1893

Assay of Stearic Acid for W. H. Mullen

1 gram used

19.3 − 30.2 = 10.9 − .2 = 10.7 cc
= 85.94%

April 21st

Assay of Stearic Acid for W. H. M.
14.7 cc − 3.6 − .2 = 11.1 = 10.9 cc =
87.54%

Qualitative assay of tails of Ogden on gives the following

Contains

no			
mercury	Uranium		Iron
lead	Cerium		Copper
silver	Zinc		Arsenic
Bismuth			Phosphorus
Cadmium			Silica
			Titanium
			Alumina
Rhodium			manganese
Osmium			Nickel & Co. small
Ruthenium			Vanadium "
Gold			Tungsten trace
Platinum			
tin		Could find no	
Iridium		molybdenum	
antimony			
selenium			
tellurium			
nickel			
Tantalum			
Chromium			
beryllium			
Gallium			

Experiments with H. cylinders using the various salts for a base.

Combinations of various salts with sulphur.

#1 Sodium meta phosphate melts at red heat but still contains a little water as liberated gas cracked on cooling

#2 Soda meta phosphate + yeast where Soda orthophosphate, melts at a red heat

#3, fused Sulphide of Soda

#4 fused Meta phosphate of Soda and Sulphur. (Sulphur volatilizes completely)

#5 [illegible] of meta phosphate of soda, and [illegible]

#6 Heya meta-phosphate of soda without oil, or substance, [illegible] red heat to melt it.
According, heat to fuse

7 mixture of sulphate of soda, & soda aluminate

#8 Na_2S & oxide of zinc

#9 Neutral Stearate of soda & soda sulphide.
This mixture gave a black mass due to reduction & separation of carbon from Stearic acid. If black mass is separated & heated to a red heat it turns yellow, which at a bright red heat fuses (see #10.)

#10 fused portion of #9

#11, fused Na_2S + a little Stearic acid.
Carbon separates

#12 20 grams Na_2S
2 " Stearic Acid
Sulphide of soda melted first, after all was fluid & most of H_2O evaporated, Stearic added, mixed upon it, & immediately poured in small dish when [illegible] fused, a lower one containing Na_2S & some Stearic, & upper one containing all Stearic. upper layer poured off after lower one had sufficiently cooled

acid [illegible] [illegible]

13 Mixture of KCN + Na_2S

14 - Na_2S + Calcium Stearate

15 - Na_2S + Stearic Acid
Stearic acid separates on cooling

16 - 10 grams Na_2S, 1/4 gram Stearic Acid

17 10 grams Na_2S 1/2 gram Stearic Acid

18 - 7/2 grams Na_2S 1/4 gram Stearic acid

#19 10 Na_2S 1/4 Stearic Acid, same as 16.

0.080319

Prof. Albert Ad. L. Walter Miller

#9	[illegible]	73.6	-0.1 = 12.7	= 25.93%
#10	52.1	63.4	-0.1 = 11.2	= 89.95%
#11	[illegible]	80.4	-1 = 11.0	88.35%
#12	25.3	[illegible]	-1 = 11.2	= 89.95%
#13	51.0	61.7	-1 10.1	= 85.7%
#14	61.6	72.9	-1 = 11.2	90.96%
#15	53.5	65.0	-1 11.4	91.56%

On the manufacture of CCl_4 + Cl_2

Chlorine gas was passed through CS_2 + the mixed gas + vapor passed through a red hot iron tube the following reaction taking place -

$$CS_2 + Cl_2 = CCl_4 + S_2Cl_2$$

The gases from the iron tube passed through a condenser cooled with ice

The O_2 - 250 grams

Hot 9.60 cc = 100 grams -

Cl_2 - 375 grams -

C-3-2
H
H
H

Assay for Phos of magnetite
as received from
R. H. Cadwalader

20 grams used, (sample by
Mr. Silvey)

= 0.114 %

Examination of a white alloy for Mr. Kennedy.

Sp. G. 9.6

Dissolved portion in HNO_3, evaporated to dryness, added H_2O, filtered. Became very slight turbid, which may be due to a trace of tellurium, or $AgCl$.

Added HCl to a portion, gave a heavy white ppt., which turned slightly grey in daylight, as Ag.

Filtered off ppt., added H_2S, gave a dark brown color.

no lead.

no measurement.

contains copper.

Filtrate from H_2S boiled, + NH_4OH added no ppt.

$(NH_4)_2S$ added dark color produced no manganese.

$(NH_4)_2S$ produced a black ppt. soluble in HNO_3

$(NH_4)_2CO_3$ + HH –

in HCl solution of $NiCO_3$ ammonia produces Ellis' purple color, similar like Ni.

H_2S HH in acid amplified solution in $(NH_4)_2S$ x.

Mass of M-Spring –
Weight in air 0.2707 grams.
" " water 0.2445 "
Sp. G.: 10.332

E – Spring –
Weight in air 108 mg.
" " H_2O 98.8 "

Quantitative assay of a sample of Bismuth metal for Silver, Copper & Nickel.
weight for each det., 50 milligrams.

Dissolved in dilute HNO_3 applied by HCl filtered & discarded in H_2S & separate solution by

Cathode weight 5.6788 mg

Ag =	5.7207 - 5.6708		0.379
	5.623 - 5.6228		.38
			40.9

for Cu determination sample weighing 72.2 mg used.
Cu = 5.670

Ni of HCl sample used.

32 mg weight of ofpiece —

5.6811	5.7096	22.5
5.622	5.6920	4
5.6218	5.6863	1.3
		27.8

Weight of filt. paper 0.2252
" " Ash 0.0342

Edw. Sh.
26. Aug.

Determination of Resin in
[illegible]

100 grams dissolved in methyl
alcohol (100 cc.

dissolved 50 grams resin
in 200 grams of Benzene Chl

Assay for Pt. year of 1875 –
[illegible]

1.09 grs. ore

Carbon 11.5.11 Rhos.

Wt. [illegible] of solid residue left on sluice after washing it a second time

weight of Pt. crucible & lids
39.0226 grams

weight of crucible & lids with the
33.1176

weight of platinum 4.0944

weight of crucible & residue after ignition
29.4896 grs.
29.0226
.4644

4.0944) 0.4644 ozs. (11.34
4.0944
37860
40944
100160
122832
173280

= 11.34% of carbon residue

Weight of sample of brick as are
42.333 grams
Drying at 100 F.
May 26th 1893

~~The~~ June 1st, 9.30 Am –
44.700
42.333
2.367

42.333 / 236.700 (5.59
211665
250350 5.6
211665
38685

= 5.6% water absorbed in 135 hours
= 5 days, + 15 hours.

Weight of brick #6, of Series B –
169.250 grams.
put in H2O at 9.35 Am, June 1st
for 24 hours.
(was left in water for 47 hours)
at the end of which, it was removed,
dried between blotters, + weighed

173.400
169.250
4.150

169.250 / 4150000 (2.44
3385000
7650000
6770000
6800000

This brick is made of 30 lbs slag, acid tar, + 70 lbs Crude Lima Petroleum, To 2240 lbs one, was baked at 500° F for 60 minutes.
It was placed in a tumbler of water for 47 hours, before soaking it weighed 169.250 grams, after 47 hours, it weighed 173.400 grams an increase, due to water of 2.44%

June 3rd 1893

Specific of Ottawa Sand

" "

weight of graduate 47.656 grams.
55.088
7.3 cc
7.432

7.3 / 7.432 (1.018
73
182
73
590

Separation of a sample of "Special sand" received from Ogden June 3rd 1893. Supposed to be larger than 30 mesh.

Weight of sample of sand 910 grams.

Weight of 40 mesh which I screened out 198 "

Weight of 90 mesh which I screened out 75.75 "

gives
21.76 % of 40 mesh
and 8.32 % of 90 "

June 7th 1893

Assay for Phos of Fertilizer - Bulk

5 grams digested in HCl

= 0.1256 grams pyrophosphate

0.1256

.063

.7768

.7768

= .0417 % P

5 - c.c. full vapor drawn at 100°C, cooled in desiccator, weighed, weigh 2.827 grams

" weigh .5654 "

.6913

.1259

Mass of lamp ~~flask~~ containing gas 23.617

~~Flask~~ 72.5 gm
7.5
1.9

7.5 74.4
7.4 76.4
1.9 2.0

1.9
1.9
2.0
5 lb of
1.933 gm

Weight of tube and bowl full of water
243.1313 lb grains

Weight of tube – 14.353
228.7783

1.933 cc of gas

Determination of Burns Creek #2088-#2115
for Phos.

5 grams used

0.6535 grams wt. of ppt. + Paper
0.5654 " " " paper
0.0881

1.43 mg P =
0.029 phos.

Determination of Castorline Creek
#1-21 - fire for Phos.

5 grams used

0.6540 weight of ppt + filter paper
0.5654 " " " filter paper grams
0.0886 weight of ppt in milligrams
= 1.44 mg P
= 0.030% Phos.

Determination of Burn Chrs.
Phos. 2.116 - 2.124 mg.

Squares used.

Weight of yellow salt 68 gms
" " yellow ppt 5654
0.1236 mg

.0.1236
1.63
3708
7416
.0201468 = 2 mg phos.
0.040% phos.

Ep 2 mg.

59.5833
72.5602 12.9769
12.9769

Wt of crucible 20.5741 grams
" " + ppt. 20.5900
.1159

= .1600 =
0.329% TiO_2
= 0.195% Ti

83.90510 24.4ce
57.5815 24.4ce
26.3135

24.4 / 26.3135 (1.0) 8
24.4444
1913
1708
2050

24.4 / 26.3135 (1.078)
24.4444
1913
1708
2055
1952
1030

Assay of Castelbine's Ore -

67 - 72

5 grams -

Weight of filter Paper 0.5654

Wt. of ppt + Paper 5.P5.1 mgs

" " Paper 5654

1197 mgs

73 - 81

5 grams -

632 mg -

65

19.7
1.63
591
1182
197
31.11 1

#1-6 = .502

weight of filter effect = .617
.502
.115

.115
1.63
345
690
115
.00187.45 = 1.9 mg
3 f

= .0385% phos - 1-6

1-9

#1

Concentrates 15.75 = 10.6 fe

Tails 120.5 = 14.72 fe

Samples

	Tails	Conc	Fe 3O4	Fe
#1	261	218	83.5	60.3.6
1-Tailing 2	195	20.5	70.5	7.6
2-Conc 3				
2-Tails 4	100	5	5	3.6
3-Conc 5				
3-Tails 6	200	7.5	3.75	2.7
7				
8				
9				
10				
11				
12				
13				
14				

1

assay this 90 mesh -

1st Run Conc.
1st " Tails

2nd Run Tails

Samples ground to 60 mesh -

	weight	weight	% Fe3O4	Fe
1 Conc	100	69.5	69.5	50.3
1 Tails	195	20.5	10.5	7.6
2 Conc	100	63	63	45.6
2 Tails	100	5	5	3.6
3 Conc	100	58	58	42
3 Tails	200	7.5	3.75	2.7
1 Conc	100	70	70	50.7
1 Tails	100	3.5	3.5	2.53
2 Conc				
2 Tails	100	2.5	2.5	1.8
3 Conc				
3 Tails	100	1.5	1.5	1.08
Avg Conc 1-2-3	100	66.5	66.5	48.1

Average of Conc - 1-2-3 - Fe

100 grams ore - 65 grams Fe3O4 = 65% = 47%

No	Weight Sands	Weight Fe_3O_4	% Fe_3O_4	% Fe
1st A	1.68	64.75	64.75	46.9

$\frac{5.6}{3.6}$
$\frac{2.0}{}$

Experiments new Bar Mag—

1st Run Ex A.

had parting board $1\frac{1}{4}$ inches but this made poor Conc -

Conc A 46.9 ~~Ellis & Spencer~~
Tails A 3.07

Removed A & run it again
Expmt B set parting board 3/4 from O. this gave better Concentrate

Conc B 53.75
Tails B 5.8

Expmt C
now rerun Tails B setting parting board at $1\frac{1}{4}$
Assay Tails C is - 3.6

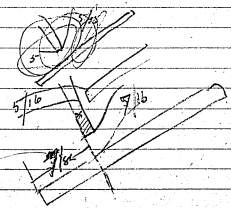
Expt D - Rerun 1st of C with board $2\frac{1}{4}$ -
there was more Conc in Conc of D than C but poorer
Tail 1.8 but only 1.3 ~~this is poor~~

2 lin ft Rate = 5/16 Slot opening

Solid Spencer

Now put Conc B C + D together & it assays mixed — 46.33.

found a leak from tails into Conc —



above is measurement for Experts starting at E —

D was much higher of X

W. heavy dropped down an inch to try experts E

1st Run Expmt - E
Board 5/8 from Zero -
Conc
Tails - 5.1

Expmt F Board 1 1/8 from Zero
Conc
Tails 3.43
This could have board 1 5/16 + be ok -

Expmt G Board 2"
its rather too close will rerun
at 1 7/8 but assay before rerun
Conc of G
Tails of G = .9

H is E F + G mixed Conc
50.13 These good enough

Experiment I. Zero is plumbed from free magnet Sour.

Board 5/8 from Zero

Conc

Tails

Experiment J Board 1 5/16 -

Conc -

Tails

Experiment K Board 1 7/8.

Conc 27.14

Tails - .94 old scale 1.14 fine scale

Experiment L (I J + K Conc together)

Conc fine scale - 52.9

OK for 14 mesh Crude

1.14 Good - 52.9

50 mesh stuff assaying 41.5

Experiment M

1st Run Board 5/8 –

Conc 55.33

Tails – 13.46.

The line is not so sharp as with 14 mesh – board screen go to ½ & give better Conc.

Experiment N.

Board 1 inch

Conc 57.33 –

Tails – 4.34.

Expmt O.

Going to remun a fresh lot
50 mesh. —

Board $\frac{1}{4}$ inch
Cones' bx $\frac{1}{8}$ x 62 better
parting board $2\frac{1}{2}$ @ 3" too high

Expmt P. Board #/2

Q Board 1 inch
only took Q tails + O P Q Cu
Combined —

Cone 55-74
Tails — 4.2

of stuff in Cone 74% will blow
out —

on trying to rerun 55.74
Core with present Condition
of angle plate the as on
page 50 - Magnet
Stick Core + wont let it
run am going to set up

much higher at X

+ find out now sticking point

We have set

much higher

from page 50 - + find out
dont stick (1-2) 55.7 Stuff

We now start with 41 % crude 50 -

Experiment No 1 Board set - negative 1/4 (12)

1/4 inch back of Zero to right looking towards stock room.

No 2 Rerun Tails 1/4 board

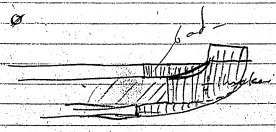
No 3 3rd Run We need assay tails + the 3 time logs.

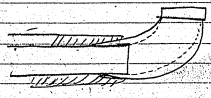
Conc = 39.07.

Tails - 6.23 -

Note - must have brass screws in wood on side of magnets.

Parting brass must be an angle not to 2 ½ inches too high -





Note
July 30, 1893 is Sunday
" 30, 1894 is Monday
MWB

Monday Eve 30th July
Tests with new brass adjusting devices

1 1/2 up 5/16 opening
parting board Neg 5/8

Core 57.5
Tails – 29.9

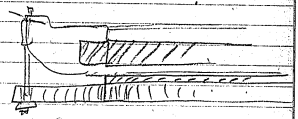
Rerun Tails

~~1/2~~ 9 inch down from 1 1/2
1/4 opening parting board 1/4 Neg 5/16
Core – 58.28
Tails – 19.25

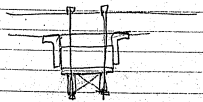
2nd Rerun or last run

1/4 more down or 1 1/4 down from 1st run
3/16 opening – parting board – 1/2 Neg
Core 55.46
Tails – 6.88 2nd last 6.15

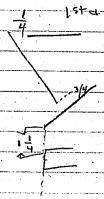
Note - wire on mag saya inch & half
in middle tape flared down
Exposes wire to iron core twill
Cross.



board to support.



Wednesday



1st Run 3/4 neg

2nd 1/4 neg - 1/4 opening Top shaved
leave bottom 3/16
on 2nd

slot above 1/8 opening

1 1/4 pos

Tacks 42.5 grams Silica
1.4 " grams

.04544
4544
.7728

28.55 : 30 x 100 x 7.72

30) 2855.000 (95
270x
150
150

30) 2140.000 (74.66
210
140
120
200

30) 2495.000 (83.14
240x
95
90
50
30
20

60.09
1158
60.2058

53.57
4778
54.0478

1175,
53.2

1228.2) 53 20.0000 (4.3 9
49128x
40720
36846
36740

Magnetic assay of ore treated with a blast of air three times

Concentrate - (after magnetic separation) gave 68.41 % fe -

Mugwump gave 60.81 % fe -

samples were ground up to 90 mesh

Oct 26 -

Magnetic assay of Core
30 grams used -
28.55 grams Fe_3O_4 = 68.78 % Fe

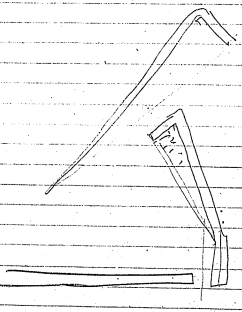
Magnetic assay of mugwump
30 grams used -
24.95 grams Fe_3O_4 = 60.21 % fe

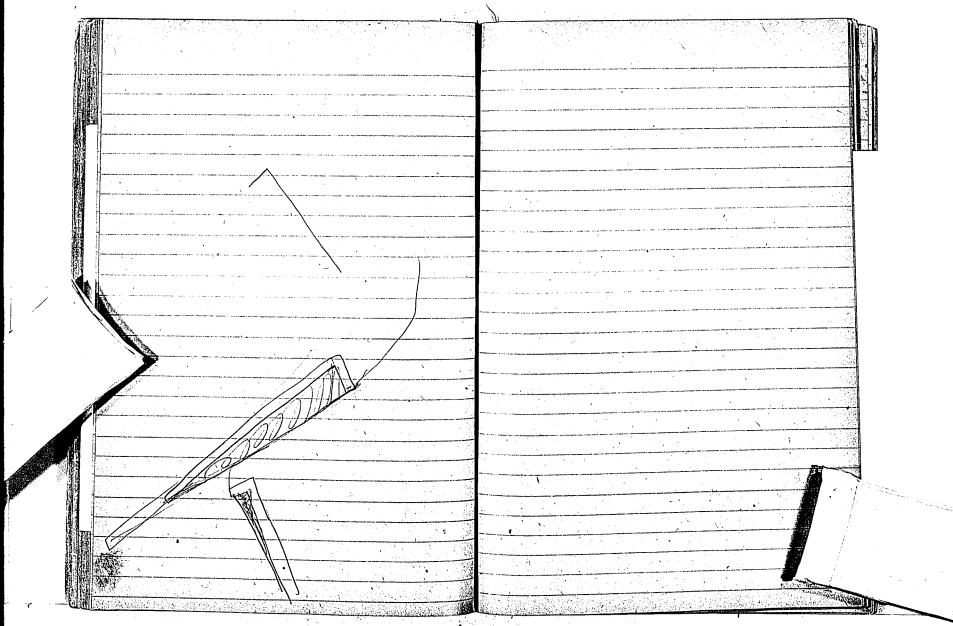
[illegible] Fe_3O_4
from magnetite,
11 magnetite per cubic 53.2 [illegible]
Fe_3O_4 weighs 1175 grams

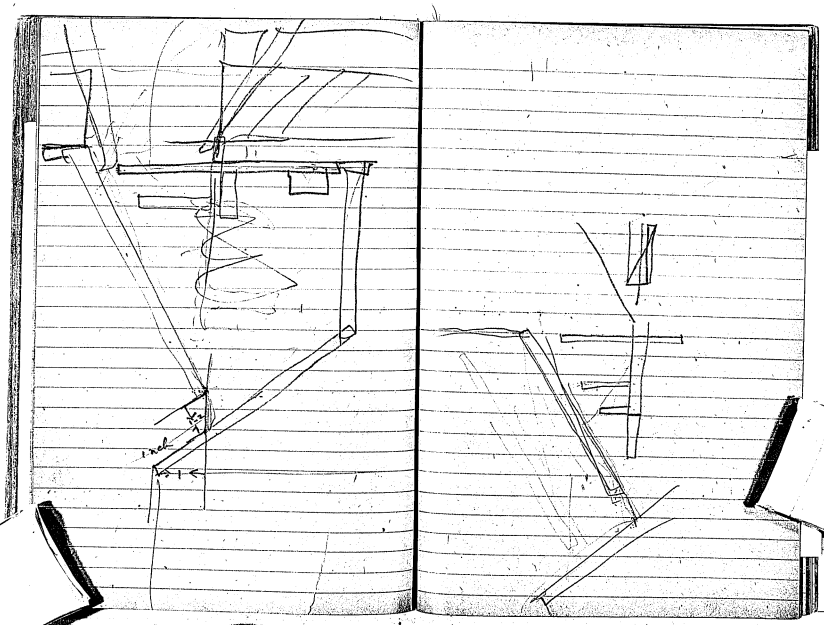
assay of above magnetite
30 grams used
22.4 ÷ Fe_3O_4 = 54.05%

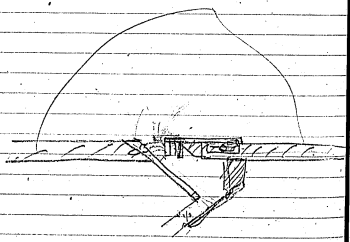
10.35

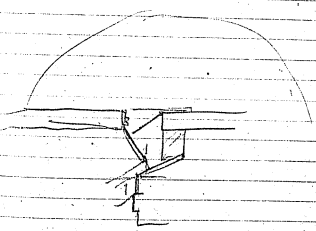
14.05
11.40
14 14.30
23
5.35
10.35
23.30
10.3.175
3
2






1 rad

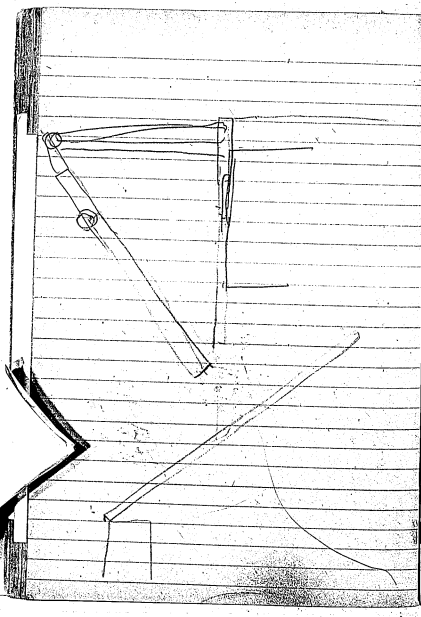




14.05
11.40
14.30
14.05
10.35
10.35
23.30
99.

14.5
11.40
15.
23
10.35
69.20

14.35
11.40
15.
14
10.35
05.40



24 — 3/16

5 ft wide

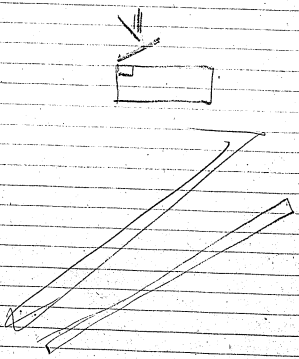
1 ft 5 inches

62
7
434

144
5
720
40
2880 / 16

1728) 2880 (1
1728
1520
1368
1521

450
16
2700
450
7200
16
43200
7200
115200



$$\begin{array}{r} 12 \\ 6 \\ \hline 72 \\ 60 \\ \hline 432^{0} \end{array} \qquad \begin{array}{r} 125 \\ 6 \\ \hline 750 \\ 60 \\ \hline 4500^{0} \end{array}$$

0.454 mg

6.257 1.080319
11.6 1.06
2 541914
803190
0.857304

.100
.400

9.5 Boulder
8 mg

7212
7212 | 800.0000 (1.1
7201
800
720
80
63.4
16
40.8 mg ag 79.4

79.4 | 1600.000 (20.16
1588
1200
794
5060

11.1 11.11 82.0
20.16 2.24 8.9 cm
666 8.87
111
2220
223776

50 mg ale

82 ag

1385 tons / 55200

88 tons hour.

65) 26080 (41. tons
260
800
23.

44
32.

52
31
5-2

31/50 156
155 0 161 2

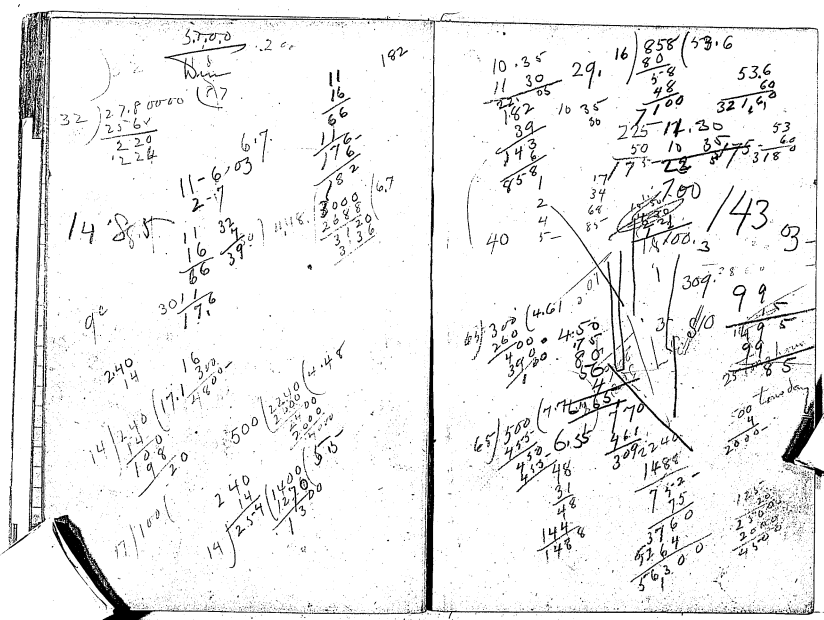
2240) 75360 (33
6720
8160
6720
1440

2240
1612
628
1 20
1256 0
628 0
75360
7100

88
57
440

335
20
6701
4
268 0 / 6000 / 2

31-
20.



Notebook, N-93-05-16

This notebook covers the period May 1893-May 1894. It was probably used by A. Y. Stewart. A few entries are by Joseph W. Harris. Included are notes and calculations regarding ore assays and other chemical analyses, the preparation of chemical solutions, the testing of bricking compounds for ore concentrates, and lubrication experiments. There are also notes relating to urinalyses of Edison and other experimenters, tables of meter zinc weights, and one page of notes regarding the Waring Electric Co.'s "Novak" incandescent lamp. The front cover is labeled "A. Y. S. Chemical Work." The spine is labeled "139." The pages are unnumbered, and several pages have been removed from the book. Approximately 130 pages have been used.

A series of routine chemical analyses and ore assays at the end of the book has not been filmed.

Tuesday May 16th 93

Preparation of Fehling Solution.

[627]

Dissolve 48 gr. of Rochelle Salts in water add 100 ccm of NaOH + aq solution of 1.12 sp.g. and then a solution of 10 gr. $CuSO_4 + 5aq$ in 40 ccm of water and dilute to 288 cc

Standardized with ~~Glucose~~ Cane Sugar

1 cc = 0.05 mm. Glucose

Wednesday May 17th

Wed May 17th 93

Preparation of Carbonsesquisulfide C_2S_3

I. Hydrogen Carbosesquisulphide $C_2S_3H_2$ ppt. came down as a resinous mass.
Agitate CS_2 with Sodiumamalgam partly with a little water.
Preparation of Sodiumamalgam 2½ %.
1 kilog.

~~120 gr. CS_2 with 2.~~

~~Negative result.~~

Thursday May 18th

Urine tested with Fehling solution for glucose
Result: negative

Friday May 19th

Preparation of 1 kilg. Sodium-amalgam 2%

Saturday May 20th

Preparation of Carbon tetra iodide from Aluminium iodide and Carbon tetra chloride.

Monday 22d

Preparation of Aluminium iodide

proportions 197 gr. of Iodine to 115 gr. of Aluminium.

The operation to be carried on in an atmosphere of CO_2 ~~fill a flask~~ In a florence flask weigh the Aluminium and pass CO_2 till all the air is driven off. Then add 1% of the quantity of Iodine to be used, and heat up till reaction begins. Then add the rest of the iodine in very small portions at one time and each time only when the previous reaction has stopped.

[illegible] the reaction has [illegible] sufficiently [illegible] keeps the Aluminum Iodide in a liquid state. When all the Iodine has been added heat to drive off an excess of the same. Then let cool, and after breaking the bottom of the flask sublime rapidly, and dissolve immediately the Aluminum Iodide in three parts of its weight of Carbon bisulphide (CS_2).

To make the [illegible] Iodide it is necessary to operate in an atmosphere of CO_2 and for this purpose use the dry gas over the Aluminum in a big flask.

Cool the flask to 0°C. and add a solution of Carbon-bisulphide saturated in a liquid compound of Carbon bisulphide [illegible] by [illegible]

The reaction takes place of itself.

Separate the liquid from the Aluminum chloride formed by decantation.

Wash with water and distill the carbon bisulphide off (Atmosphere of CO_2)

The Carbon tetra Iodide is a darkish red crystalline body very much like Iodine.

Wash with water then with Sodium bisulphite and

The body weight to be dried in a Vacuum dessicator over sulphuric acid as it decomposes on heating, and attacks paper.

212 gr. Aluminum Iodide
in 636 gr. Carbon bisulphide
60 gr. Carbon tetrachloride
or 60 gr. Carbon bisulphide
weight to give
100 gr. Carbon tetra Iodide

Practice

$3CCl_4 + 2H_2O_2 = 3CO_2 + 2HCl_6$

Tuesday May 23d

~~Added this day~~

Mass 0.245

Tuesday May 23d

Experiment on Elemi Gum with Nordhausen sulphuric Acid

Test petroleum residue for sulphur.

10 gr. of Petroleum residue

Sulphur only in traces.

June 1st 02

Test of Brick 30 minutes in furnace at 500°F.

Pt crucible + ore = 22 gr. 3200

Pt crucible = 22, 3000

Ore = 1,02 gr.

Crucible + $BaSO_4$ = 22, 3030

Crucible = 22, 3000

$BaSO_4$ = 00,0030

~~0,0039~~

0.0011

,02910

~~,039 = 3.9~~

~~3.9 %~~

0.0039 S.

0,040

~~0,3901 %~~

~~0,03901~~ S.

June 2d

Test for Sulphur in Sludge Acid.

Pt + Acid = 33,8250
Pt Dish = 25,8850
Acid = 18,9400

31,7540
25,8850
Amount of residue after Ign. for 500 5,8690

June 2d

Analysis of Wax.

1,6650 gr. of Wax took 18,8 cc. of Soda solution to neutralize

or they contained

1,509972 gr. of Stearic acid

or 90.69 % Acid

or 1,51 9.30 Cerosine
or 90.70 Stearic.

Acid

at 500°F.

Loss 8 gr. W. 11 gr.

2d test for Sulphur.

Weight 11 gr.
after 1 h. at 700

$$\begin{array}{r} 29,6225 \\ 22,9000 \\ \hline 6,7225 \\ \text{Sch} \quad 1 \\ \hline 5,7225 \end{array}$$

0,29 %

30 pounds to the ton

0,0038 % S to the ton

1. The Novak incandescent Lamp. T.N.

Weight of the Lamp = 83,4560

Weight of the Lamp full of air = 23.654 grams

Weight of the Lamp full of water = 225.5874 grams

Cubic volume of globe, 201.8984 cc.

Weight of air in bulb (by calculation) .261 grams

Weight of bulb exhausted (by calculation) 23.428

Weight of gas in bulb (by difference) 0.028

28,0490
It crucible = 22,3100

CaOH + ay = 5,7390

24,0870
23,3100
0,7770

$\frac{777}{3,03} = \frac{x}{100}$

17700 (573
17119 30,89
0061100
4584
051100
51,57
0,03 0

Experiments on Lubricator
out of Rosin oil and slacked
Lime.
Lime to be slacked with hot
water and well washed to
get rid of stone substances
and silica, and only the
fine milky slacked lime
drawn off and used

The series of experiments resulted
in the following method:

A weighed quantity of
rosin oil is heated to boiling
and the lime gradually dropped
in as long as it dissolves
clear, the reaction is accompanied
by a bubbling up of the
mixture, and it gives off
steam.
On cooling the mixture
stiffened and gave a clear
and greasy substance
which pasta good

consistency from freezing point up to 95° F.

A portion of this clear grease was ignited and heated on a platinum crucible till the residue was perfectly white.

Crucible + grease = 26.00
Crucible = 22.30
grease = 3.70

Crucible + CaO = 23.645
Crucible = 22.300
CaO = 0.345

33.5 | 3.7
33.3 | 9.05 % CaO.
00200

Test to determine the quantity of CaO in the milky and wet slaked lime.

~~Quicklime~~ =
Lime + crucible = 27.2700
crucible = 22.3000
weight of wet lime = 4.9700

After igniting = 24.0400
Crucible = 22.3000
1.74

17400 | 4.97
1491 | 35.01
2490
2485 35.01 % CaO
00500 in the wet

Lime mixture

Experiments with
Rosin & Lima oil to combine
it with lime

I 20 gr. Lima oil
& 20 gr. Rosin
gave a sticky unsuitable
mixture

II 5 gr. Lima oil
10 gr. Rosin
gave an equally bad
result

III 10 gr. Lime oil
10 gr. Rosin
gave an equally bad
result.

Stir slacked lime with sufficient water to a rather thick milky fluid like thing, & sieve to remove stony substances, and allow to stand till the fine milky lime settles, let the water off.
To this white paste of milk of lime let the rosin oil flow, stir till the mass becomes thickly fluid water being separated.
Quantity of lime 20 to 25 per cent.

The resulting substance is a thick opaque yellowish butter which had stood quite a big vaccation in temperature without changing consistency

Experiments for determining quantity of Sludge Acid separated out of Petroleum (Crude) by Sulphuric Acid. — at 115°F.

I 40 gr. Penna petroleum —
5 gr. Sulphuric Acid
2.5 gr. Sludge Acid.

35 [i] 6.25 %

II 96. Penna petroleum
8 Sulphuric Acid
5 Sludge Acid

5.20 %.

III 60 Penna petroleum
8. Sulphuric Acid
4.50 Sludge Acid

7.50 %

40 gr. Lima Oil
5 gr. Sulphuric Acid
3.5 gr. Sludge Acid

8.58 %.

60 gr. Lima Oil
5 gr. Sulphuric Acid
7.50 gr. Sludge Acid

12.16 %

60 gr. Lima Oil
3 gr. Sulphuric Acid
5 gr. Sludge Acid

8.33 %

Lubricator experiments

I Sodium Sulphate does not [illegible] with [illegible] oil [illegible] agreeable [illegible] combine [illegible] heating.

The product is a yellowish brown transparent mass of soapy texture, [illegible] with water. If Potassium carbonate is used it is a lumpy mass in the bottle, this mass also being [illegible] on the water both apparently melts and forms a solution which however separates out the soap on cooling.

Does not seem good for lubricating purposes.

Sodium Sulphate

Does not seem to combine with resin oil. The sulphate dissolved in water separates out of the resin oil as soon as the water boils off.

Lubricator experiments

II Magnesium Carbonate does not seem to combine readily in either the dry or moist state with Rosin oil. In the first experiment crystalline Magnesium carbonate was used

III Magnesium Oxide obtained by ignition of the crystalline carbonate does not combine readily with rosin oil in the cold, and does not seem to combine in any quantity on heating.

Lime oxide does not seem to combine to any extent readily with resin oil even after prolonged boiling.

Ferrous sulphate & pot. by
[illegible] and Carbonate of
Soda $Fe(OH)_2 + Fe(OH)_6$

Combines on boiling to black but
gives a syrup which has very
poor lubricating qualities.

Chromium Metal & Carbonate
combine on boiling with resin
oil and form on cooling a
yellowish brown transparent
resin. The resinate however does
not seem to be easily made -
directly out of resin oil and
chromium oxide, this as a
lubricant is too sticky

Ferrous carbonate combines with
resin oil after boiling the
mixture for a long time till all
the water is driven off, the reaction
takes place only slowly, the product
is a yellowish hard vitreous mass
insoluble in an excess of resin
oil and also in turpentine
The product seems to be a sulphate
of iron which has lost its water
of crystallization

Carbonate of Iron seems to combine
easily with resin oil on boiling
but gives a thin iron lubricating
reddish mixture.

Calcium sulphide suspended in
water and added to boiling resin
oil does not seem to dissolve readily
but a reaction takes place as the
Calcium sulphide turns black and
forms a stiky suspended mass
in the oil.

Zinc carbonate

A solution of zinc carbonate in water added to fuming rosin oil deposits the zinc carbonate as a hard stony substance as soon as all the water has boiled off.

Ammonium sulfide

Ammonium sulfide first darkens rosin oil but soon is itself driven off all of leaving the rosin oil unchanged (apparently).

Sodium Silicate

No Good.

Aluminum hydroxide $Al(OH)_3$

Sulphur

Finely powdered sulphur melts and then dissolves very readily in rosin oil, but crystallizes out again on cooling forming a sort of emulsion yellowish emulsion in which sulphur with crystalline structure is suspended. Has no lubricating properties

Sulphur mixture and Sodium Oleo rosin oil soap.

Combine on heating to a clear yellowish brown to transparent syrup which coagulates to a transparent mass on cooling. The sulphur separates out after the cold mixture has been standing for an hour or so.

Dissolves on heating in rosin oil and forms a yellowish emulsion which has however no good lubricating properties.

Sludge Acid experiments for preparing lubricator

Sludge Acid & Rosin oil forms a too thick mass for lubricating purposes.

The Sludge Acid was dissolved in Rosin oil on the water bath and formed a dark brown syrup.

Sludge Acid and Tallow melted together form a dark brown mass which is too solid and sticky for lubricating purposes

Sludge Acid melted with tallow dissolved in petroleum separates out on the cooling of the mixture

Sludge Acid rosin and tallow form a fluid syrup which has a darkish brown colour and poor lubricating qualities

Sludge Acid } Sludge Acid
Rosin oil } Rosin oil
Tallow

Sludge Acid } Sludge Acid
Sperm Oil } Sperm Oil
Tallow

Sludge Acid } Sludge Acid
Cotton seed oil } Cotton seed oil
Tallow

Petroleum } Sludge Acid
Sludge Acid } Tallow
Tallow

Sludge Acid and Sperm oil mass too fluid and poor lubricating properties

Sludge Acid Sperm oil and tallow have poor lubricating qualities and very little body

Sludge Acid petroleum and Tallow with a large percentage of tallow give fairly good lubricating products but the amount of tallow has to be very large

Stearic Acid does not seem to
be a good addition to lubricants
as it diminishes the lubricating
qualities rapidly and although
it increases the [illegible] and
consistency the main effect seems
to make the mass sticky and
to make it gum.

Rosin oil Slacked Lime
& Tallow

This mixture does not have enough
body after a month for 24 hours
it is still very fluid and
for a lubricator fluidity is
[illegible]

Rosin oil Solway Soda Tallow

Does not give a good mixture

Determination of Platinum
in a platinum alloy.

Crucible + Pt	11,4355
Weight of crucible	11,424
	0,0115
Filter ash	= 0,0010
Weight of Pt	= 0,0105

Weight of wire = 0,1750.

6 % Platinum

Almond oil

[illegible] oil and [illegible]

[illegible] oil

Paraffin and [illegible] oil

Petroleum [illegible]

Lime slacked, Rosin oil, and Tallow.

in proportions of 30 gr. of Lime 34 Rosin oil and 5 gr. Tallow forms a yellowish white mass with good consistency and fairly good lubricating properties.

This mixture is very much like the Rosin oil and slacked lime mixture tried before.

Palm Oil Lubricants

(Heavy wagon Grease) 1.57 cents @ lb

Melt 31 parts of Palm Oil with 8.5 parts of tallow add a concentrated solution of 3.5 parts of Soda, then 92 parts of Water stir well and allow to congeal.

Consistency fair, lubricating fair

Yellowish white mass.

Grease for very heavy wagons

1. 1.25 cents @ lb. Winter
2. 1.50 cents @ lb. Summer

2) (Summer) is a slightly yellowish mass of good consistency and fair lubricating properties.

Proportions for 2.

Tallow 420 palm oil 490
soda 35 water 2300.

American palm oil lubricant

A Tallow 15. Palm oil 10. Soda 2.5
Water 16. 3.04 cents @ lb.
B Tallow 10. Palm oil 10 Soda 3.5
Water 30. 2.06 cents @ lb.

Both these lubricants are a yellowish substance of the appearance of butter after standing for a few hours they remained smooth and fair lubricating qualities.

A has more body than B is perhaps a little too thick and gritty.

A

Tallow	750	Tallow	380
Palm oil	380	Palm oil	125
Paraffine	200	Paraffine	65
Soda	50	Soda	25
Water	1300	Water	420
1.89 @ lb.	N.g.	2.54 @ lb.	N.g.

Tallow	280	
Palm oil	100	
Rosin oil	70	
Soda	20	N.g.
Water	500	
	2.10 @ lb.	

Tallow	10	1.36 @ lb.
Palm oil	10	
Rosin oil	20	
Soda	7	
Water	60	

This mixture does not combine to a mass of any consistency and is of no use as a lubricator as the parts are only suspended in the water and do not form a mixture of any ~~homogen~~ uniform composition

Tests for Albumen in Urine
with Potash of Solution

Mr Brown

Urine passed at 1.30 PM
Friday July 7th
Tested at 5 P.M. July 7th
Sugar none

Tested at 9 AM
Saturday July 8th
no ppt

Tested at 12.15 PM
Saturday July 8th
no ppt of Albumen
reddish Brown.

Harris

Urine passed at 3 P.M
Friday July 7th
Tested at 5 PM July 7th
Sugar none

Tested at 9 A M
Saturday July 8th
no ppt

Tested at 12 Noon
Saturday July 8th
no ppt

A. J. S.

Urine passed at 3 P.M
Thickly July 7th
Tested at 5 P.M
July 7th
Sugar none
at 9 A.M. Saturday
July 8th no print
12 Noon Sat.
July [illegible] pt

C. C. Edison

Urine passed at 6.45
P.M. Thickly July 7th
Tested 9 A.M. July 8th
blue solution clouded and
turned a milky green.

Tested at 12.15 P.M. Saturday
July 8th Short ppt fluid
turned a cloudy red

Edison

Urine passed 9 P.M.
Friday July 7th
Tested 9 AM Saturday
July 8th
no ppt

Tested at 12 Noon
Saturday July 8th
no ppt - filed Sunset
colour

Edison

Urine passed 10.20 AM
Saturday July 8th
Tested immediately no ppt
Tested 12 Noon Saturday
July 8th
~~no~~ ppt
Pelli g not yet discoloured

Ay J

Urine passed at 10.20
A.M. Saturday July 1st

Tested at 12 Noon
Saturday July 8th
Feeling not even disturbed

Harris

Urine passed 11.55
A.M. Saturday July 8th

1893
Feb

Tested at 12 Noon
Saturday July 8th
Feeling not even disturbed

Urinary Tests

Boil urine down to coagulate suspended matter, shake with animal charcoal, filter and then test for sugar with Fehling. Samples of urine should always be drawn from well mixed twenty four hours

Take 10 cc of urine in weighed Platinum dish and evaporate to dryness, and weigh to constant weight, determine the total quantity of solid matter

Ignite solid matter weigh, determine quantity of inorganic matter

Treat ash with nitric acid and water.

Silver nitrate precipitates the chloride

Barium chloride the sulphuric acid

Ammonium molybdate the phosphoric acid.

Urinary test.

Tuesday July 11th

NRS 1893

Mr Edison – Twenty four hours urine no sept with Fehling – Samples taken separately in small quantity gave a slight sugar reaction.

Test for Albumen negative

Wednesday July 12th

Urine tested with Fehling no sept (sugar) for albumen negative.

Tuesday July 11th

Heise Fehling solution

ppt (sugar)

Albumen test negative

Wednesday July 12th

Fehling Solution

ppt sugar

Albumen test negative

Thursday July 13th

Harris Urine fresh passed at 10 A.M.

tested immediately

with Fehling no ppt.

no albumen reaction

sp. g. 1019.

Urine passed at 1.15 PM.

sp. g. 1024

with Fehling no ppt

albumen reaction none

Thursday July 13

urine passed one night

Heise sp. g 1025.

no ppt with

Fehling Solution no albumen

reaction

Friday July 14th

sp. 1018 urine passed

over night no ppt with

Fehling no albumen reaction

Quantitative determination of Titanium in Chalcocite Ore

Pt dish + ore = 25,40[illegible]
Pt dish = [illegible]

Ore = [illegible]

Pt dish + ppt = 20,722
Pt dish = 20,519
0,203

Crucible + ppt = 22,143
Pt crucible = 22,124
00,019
filter ash 00,003
weight ppt = 0,0157

Harris = 0,195 % Ti
0,312 % TiO_2

Stewart = 0,192 % Ti
0,316 % TiO_2

Harris

Urine passed at 9 AM
Sp. g 1020.
No reaction with Bismuth and nitrate.

Mr Edison

July 19th Urine passed Morning.
Sp. g = 1026.
No sugar
Albumen none

Qualitative Analysis of non magnetic Shallow Ore

Examination for Sulphur — none

no Al, Fe, Ti, Bi, Cr, Cl, P, As, H, Pb, In, Sb, no albumen, Ni, Co, Zn, Cu, Cr, no Ba.

Acids. S. O. SO_4 no H_2SO_4 Ac (HCl) (Cu) (Mg)

no Al no Cr no albumen

Mr Edison

Urine passed July 20th evening

No albumen

No Sugar

Gravity 1024

Urine passed July 21st morning

No albumen

Traces of Sugar

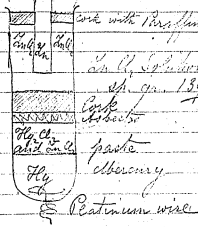
gravity 1028

Analysis of Concentrates and Tailings of Iron ore.

Concentrate 1#

Weight	Weight Fe_3O_4	Per Cent Fe_3O_4	Per cent Fe
50	38,50	73,13	52.94
Tails 1#			
50.	26,50	52,16	37.75
Concentrate 2#			
50	42	79.80	57.77
Tails 2#			
50	32	60.80	44.02

Preparation of Standard Cell for Mr. Kennelly



In C.P. bar amalgamated with H_2SO_4 and Zn

$ZnCl_2$ Solution prepared out of used $ZnCl_2$ ~~[illegible]~~

$ZnCl_2$ tested for impurities showed but a slight trace of iron

it was tested for Hg, Sb, Cd, Sn, Pb, Iron Aluminium Cl, H_2SO_4 and HNO_3

Sp. gr. of Solution at 15°C. 1,391.

Charge Pt wire 0,042 and $ZnCl_2$ to Desp. N°587 Mr Kennelly

Mr. Edison's

Urine passed Evening July 25th

Sugar: none
Albumen: none
Reaction: acid
Sp. g.: 1024

Urine passed Morning July 26th

Sugar: none
Albumen: none
Reaction: acid
Sp. g.: 1024

Fehling Solution

H { 96 gr. Rochelle Salts
188 gr. Water
33 gr. NaOH
100 gr. Water

B { 20 gr. $CuSO_4$
Water 288

A { 192 gr. Rochelle Salts
376 gr. Water
66 gr. NaOH
200 gr. Water

B 40 gr. $CuSO_4$
576 gr. Water

Bronzing Brass.

Bath No 1

Muriatic Acid = 3 lbs.
Nitric Acid = 1 lb.
Chloride of Iron = 1 lb
Arsenic = 1 ounce
When dissolved add water 1 lb.

Bath No 2.
Muriatic Acid 5 lbs
Nitric Acid 2 ounces
Powdered Cobalt 1 lb.

Try proportions of nitric acid in bath No 1. So that a perfectly even unspotted surface results.

Dip the object in bath No 1 then withdraw and dip in bath No 2 then wash with hot water

With arsenic in the above proportions color too light the ~~quantities~~ proportions use where the following

1 { 30 gr. Hydrochloric Acid
10 gr. Nitric "
10 gr. Iron Chloride
~~11~~ 1 gr. Arsenic
10 gr. Water

2 { 50 gr. Hydrochloric Acid
1,125 Nitric
10 gr. Iron Scale

Experiment given up to attend to bricking experiment

April 11th 1894

Agreed very dark color is obtained by dissolving 2 1/2 oz. white arsenic in HCl + dilute HNO3 + 1/2 oz. Ferri sesqui chlorid in H2 mixing + diluting to about 1 pint

Harris

Urine passed Morning
Urine pass by Mr Edison

Sugar (trace) (?)
Albumen (trace) (?)
Sp. gr. 10.28.
Reaction acid.

Urine passed July 31st
evening by Mr Edison
Sugar (trace)
Albumen (trace)
Sp. gr. 1030
Reaction acid

Urine passed by Mr Edison
August 1st evening.
Sugar trace
Albumen none
Sp. gr. 1028
Reaction acid

Sugar none
Albumen none
Reaction acid
Urine passed
Morning Aug 2d

Experiments on Sludge Acid
W

Dish + Sludge acid = 50,250
Weight of dish = 31,904
Sludge acid 18,346

One 1/2 hour in air bath at
600 F. gives

Residue + dish
Weight of dish
Residue

No result boiled over

Dish + Sludge Acid = 32,960
Weight of dish = 29,47
Sludge Acid = 3,490

Dish + residue = 30,752
29,47
1,282

12820 | 369
1047 | 36,73
0235 6 0
2094
0256 0
2443
1170

Residue 36,73 %.

Urine passed by Mr Edison
Morning 9.30 May 2d
1 pint
Sugar none
Albumen none
Sp. gr. 1018
Reaction acid

Experiments with a mixture of 30 parts Sludge Acid 10 parts Urina petroleum and 1 part oxydising agent

I. Chlorate of Potash
Dish 26. 80,5

3 gr. Mixture
1 gr. Chlorate of Potash

After ½ hour at 600° the mass was nearly totally carbonized forming a dark puffed up film

~~Weight of residue~~

80,5
83.
Weight of residue = 2,5 gr.
1,5.

250 | 9 or 27,7%
18 | 27,7
070
63
070

150 | 8
70 | 18,75
64
60
56

2 Salpeter Dish 27. 85,5

5 gr. Mixture
1/2 gr. Nitrate of Soda

After 1/2 hour at 600 the mass still smelt and looked like vinegar acid

Weight of residue 88
Weight of residue 85,5
2,5

or residue 45 5/11 %

2500 | 55
220 45.45
0300
275
1250
220
1000

5 200

5 Manganese dioxide Dish 28. 84

5,5 gr. Mixture
1/2 gr. Manganese dioxe
6 gr.

do.

88
84
Weight of residue 3. 92.

or 50 %

5, 2,5

2500 | 55
220 45.45
0300
275
1250

4) 1 part Nitrate and 1 part Carbonate of Soda

Dish 29 33

6 gr. Moisture
1½ gr. Carbonate
½ gr. Nitrate Soda

do. 88
83
Weight of residue 5 gr.

500 | 7
49 | 71.4
010
30

or 71.4 %

400 | 6
36 | 6,6,66

5) 1 part Chlorate and 1 part Carbonate of Soda

Dish 30. 86,5

5,5 gr. Moisture
½ gr. Carbonate
½ gr. Chlorate

do. 90,5
86.5
Weight of residue 4 gr.

5000 | 6.5
390 | 61.5
01100
65
350
325
0250

or 61,5 %

3000 | 55
275 | 54.54
250
220
300

P

Dish 31. Potassium Carbonate
weight 83 gr.

5 gr. Mixture
1 gr. Carbonate

Weight 86.
83
Residue 3 gr.

2 — 5

40 %

Dish 32 Sodium carbonate
weight 84 gr.

5,5 gr. Mixt
1 gr. Carbonate

Weight 87
84
Residue 3

2. — 5,5

2000 | 55
165 36,36
0350
330
0200

Dish 33 ~~Magnesium~~ Calcium Carbonate
weight 83 gr.

5 gr. Mixture
1 gr. Carbonate

85,5
83
2,5

1,5 — 5

30%

Dish 34 ~~Calcium Carbonate~~ Magnesium oxide
weight 82 gr.

5 gr. Mixture
1 gr. Oxide

84,5
82
2,5

1,5 — 5

30%

Dish 35 Calciumoxyde.
weight 84

5 gr. Moisture
1 gr. Oxide.

86,5
84
2,5

1,5 — 5.

150 | 5
30 %.

Dish 36. Moisture with ore to
weight 96 ascertain loss of weight
in bricking.

10 gr. Ore Moisture

95,5
86,
9,5

950 95 %

Experiments on Pricking Mixtures

26) 8 gr. Mixture 1 gr. Chlorate Potash
27) 5 gr. Mixture 1½ gr. Nitrate Soda
28) 5.5 gr. Mixture 1½ gr. Manganese Dioxide
29) 6 gr. Mixture ½ gr. Carb. ½ Chlorate
30) 5.5 gr. Mixture ½ gr. Carb. ½ Chlorate
31) 5 gr. Mixture 1 gr. Carbonate Potassium
32) 5.5 gr. Mixture 1 gr. Carbonate Soda
33) 5 gr. Mixture 1 gr. Carbonate Calcium
34) 5 gr. Mixture 1 gr. Mg Oxide
35) 5 gr. Mixture 1 gr. Calcium oxide
36) 10 gr. Mixture
A 235 Mixture of ore and Sulphuric Acid (as in pricking)

A1) Mixture of ore and sulphuric Acid mixture with 1 gr. Nitrate and 1 gr. Carbonate of Soda
1000 gr. Ore 18. Sulphuric Acid mixture
A2) 1 Carbonate 1 Nitrate of Soda
same mixture with 1 gr. Silicate of Soda
A3 same without Silicate of Soda
A ore alone
A4 ore with mixture A.
do.

	Weight of A.	Weight of Mixture	Weight of Pricker	% Paid
26	80.5	9 gr.	2.5	18.75
27	85.5	5.5 gr.	2.5	40
28	84	6 gr.	3 gr.	45.45
29	83	7 gr.	5 gr.	66.66
30	86.5	6.5 gr.	4 gr.	54.54
31	83	6 gr.	3 gr.	40 %
32	84	6.5	3	36.36
33	83	6.	2.5	30 %
34	82	6	2.5	30 %
35	84	6.	2.5	30 %
36	86.	10	9.5	95 %
A	—	235 gr.	232.	98.72 %
		loss of mixture	70.9 %	
A1	200	250.	Corrected 246 or 245.5	98.0
A2	229	251.	249	99.20
A3				
A4	200.5	250.5	249.5	
	200.5	250.5	248.5	99.00
	230	250.	247	

Experiments on Mixture.

	Weight of dish
Ore alone	250.5
Ore with 30 Sludge 10 Lima 1 gr. Carbonate 1 gr. Nitrate Soda to a 100 Ore	250.5
"	250.

Sludge acid mixture 10 gr. Nitric acid 1 gr.

dish (38) Weight of dish 80.50

Dish (39) Weight 82.5 H_2SO_4 1 gr. HNO_3 1 gr. Mixture 5

Dish (40) 81 of SO_4 2 gr. 6.5

Dish 41 83.50 HNO_3 1 gr. HCl 1 gr. Mixture 6.5

Dish 42 Lima oil and Sludge Acid weight 85. Mixture 6.5

Dish 43. weight 86 HNO_3 1 gr. Mixture 5

Dish 44 weight 88.5 Bleach. P. 2 gr. Mixture 5

Dish 45 weight 80.5 H_2O 1 gr. 5.5

Dish 46 83.5 $FeCl_3$ 1 gr. 5.5

Dish 47 80 Br 1 gr. 7

Dish 48 84 Cyanide 1 gr. 1.5

Dish 50 84 Iodine 1 gr. 7

8 Mn O_2 1 gr. 8.50

Bricking Mixture

Weight of Residue	Per cent loss	Percent loss orig. m
249.5	0.40%	
248.5	1.0%.	88.63%
246.5	1.6%	77.77%

Weight Mixture	Residue	Percent Res.	Percent Loss
11.50	upset		
7	85.50 2	40 %	60 %
2.50	84.50. 1.50	23.07 %	76.93
8.50	87 3.50	53.84 %	46.16
6.50	87.50	38.46 %	61.54 %
6	89.50	90.	30 %
7.	86.50	40. %	60
upset			
	86 1	20 %	80 %
	86.50 1.50	21.4 %	78.6 %
	83.50 .50	10 %	90 %

Tests on bicking mixture
Sludge acid and Lima petroleum
in proportion of 30 to 10.
Tried filter effects of different cheap
ch. organic salts (results negative)
Then tried effect of strong anorganic
acids. —

Urine passed by Mr Johnson Date	Sugar	Albumen	Sp. Gr.	Reaction
Evening July 25	None	None	1024	acid
Morning July 26	None	None	1024	acid
Evening July 31	Trace	Trace	1030	acid
Morning Aug 1	Trace	Trace	1028	acid
Evening Aug 1	Trace	none	1028	acid
Morning Aug 2	None	None	1018	acid
Evening Aug 2	Trace	Trace	1028	acid
Morning Aug 3	Trace	none	1027	acid

Dish	Weight	Compound	Moisture	Dish with Residue	Residue	Parents	Per loss
51	84	Zinc SO_4 2g.	5.5	86	4	72.72	27.28
52	78	Tellurous 2g	7	82.5	2.5	35.71	64.29
53	84	Acetate 3g.	18.	upset			
54	84	Chloride 1g.	5.5	87.5	2.5	45.45	54.55
55	83.5	Nitrate 2g.	7	88.5	3.5	50	50
56	84	Arsenate 2g	15.5	88.5	2.5	45.45	54.55
57	81.50	H_2O_2 1g	5	83.	1.5	30	70
58	83	Abs boracic 1g	6	87	3	50.	50
59	82	Alkg SO_4 1g	7.5	87	4	53.33	46.67
60	80.5	Abs CO_3 2g	15	85	1.5	30	70
61	85	Abs NO_3 2g	6	upset			
62	86	Myrantate 2g	6	90.5	2.5	41.66	58.34

Effect of ~~Sludge~~
Sulphuric & Lima

Weight of beaker 95 gr.

150 gr. of Lima treated with
10 gr. Sulphuric gave 21,5
Sludge acid or 14,33 %

added 10 gr. more Sulphuric

105,5
75
130,5

and left 30,5 Sludge
acid
or 20,33 %
after standing for 5 days
or 21 %

106,5
75
131,5

Try 200 Sludge
150 Lima
82,5 Nitrate of Soda
38,5 H_2SO_4

100 gr. Sludge
70 Lima
10 H_2SO_4
6 $NaNO_3$
} would not brick

100 gr. Sludge
90 Lima
10 H_2SO_4
6 $NaNO_3$
} would not brick

100 gr. Sludge
81 Lima
10 H_2SO_4
6 $NaNO_3$
} wont brick

21 Sludge
10 Lime
1 H_2SO_4
1 Na NO_3
} wont brick

24 Sludge
8 Lime
Sulphur 20
} 250 gr. Ore
3.80 mixture
bricks fairly well
hardens well in the furnace
makes a very hard brick
~~would cost 9.92 cents~~

24 Sludge
8 Lime
32
32 gr. to 224.
wont brick

20 Sludge to 200 Ore
1 Sulphur
} wont brick

24 Sludge
8 Lime
10 Sulphur
} bricks fairly well
hardens in the furnace
very well
~~would cost 8.92 cents~~

N

24 Sludge
8 Lime
1 Sulfur
} bricks fairly well
hardens in furnace
well
would cost 8.92

Brick mixed in the ordinary proportion
weight of O = 195.5
after ½ hour at 600 weight = 115,
loss in weight = 1,5
~~Brick with proportion N of S~~
~~weight 3.1475~~ Loss 47.6%
weight of N = 177
after ½ hour at 600 weight = 175,5
loss in weight = 1,5
Loss 57.7%

21 Sludge
7 Lime
12 Rosin
} bricks fairly well
hardens in furnace very well
weight before heating = 184,50
weight after = 183,50
loss in weight = 1gr.
loss 40.4%

would cost 7.93

R
I

R_{II}

21 Sludge
7 Lime
1 Rosin
} bricks fairly wet hardens well in furnace

weight of brick before = 173.50
and after heating = 172.
loss 1.50

would cost 7.43

R_{III} loss 67 % Residue 33

18 Sludge
6 Lime
2 Rosin
} bricks moderately well only hardens very well

weight of brick before 175.50
and after heating 174.50
1.00

loss 45.8 Residue 55.20

would cost 6.94

18 Sludge
6 Lime
1 H_2SO_4
1 Chromate
} wont brick

18 Sludge
6 Lime
24 Asphalt
} too stiff wont mix

18 Sludge
6 Lime
10 Coal tar pitch
} dont mix well wont do

H_2SO_4 and Sawdust } not sticky wont do

HNO_3 and Sawdust } no good

18 Sludge
6 Lime
5 Silphuric
} wont brick

R 4
27 Sludge
19 Lime
5 Silphuric
} bricks fairly well hardens well on heating

weight 175.5 - 174.5 | 31.15 %
est 113.91 | 68.85 %

R 5 — 24 Sludge, 8 Lime, 5 H_2SO_4 — bricks fairly hardens well in furnace

cost (13.42)

weight 182.50 — 181.

Loss 33.22 Residue 66.78 %

R 6 — 21 Sludge, 7 Lime, 5 H_2SO_4 — bricks moderately well hardens well in furnace

cost (11.93)

weight 172.50 171.50

39.37 loss 60.63 Residue

R 7 — 24 Sludge, 8 Lime, 2.50 H_2SO_4 — bricks moderately well hardens well

weight 180.50 179

46.10 Residue

R 8 — 21 Sludge, 7 Lime, 2.5 H_2SO_4

O — 30 Sludge, 10 Lime — 13.20 cents Residue 52.8

N — 24 Sludge, 8 Lime, 1 Sulphur — 10.56 cents Residue 42.3

R 1 — 21 Sludge, 7 Lime, 2 Rosin — 10.24 cents Residue 9.6

R 2 — 21 Sludge, 7 Lime, 1 Rosin — 9.74 cents Residue 33

R 3 — 18 Sludge, 6 Lime, 3 Rosin — 8.92 cents Residue 55.2

R 4 — 27 Sludge, 9 Lime, 5 Sulphuric — 15.68 Residue 68.85

R 5 — 24 Sludge, 8 Lime, 5 Sulphuric — 14.36 Residue 66.78

R 6] 21 Sludge
7 Lime } 12.64 cents Res. 6.1
5 Sulphuric

R 7] 24 Sludge
8 Lime } 12.46 cents Res. 46.1
2,5 Sulphuric

R 8] 21 Sludge
7 Lime } 11.74 cts Residue
2,5 Sulphuric

R 9] 21 Sludge
7 Lime } Residue
8 Resin } 10.82 cts 60.32
2,5 Sulphuric
weight 174 – 173

R 10] 21 Sludge
4 Lime } wont brick

R 11] 21 Sludge } bricks poorly
3 Lime } hardens fairly well
weight 170,5 – 170 } cost 7.68 (No good)
Residue 72.38

R 10] 25 Sludge } mixes well, bricks well
5 Lime } hardens well.
178.50 – 178 } 9.70 cents Residue 79.08

R 11] 20 Sludge } mixes well bricks fairly
4 Lime } well hardens poorly
172.50 – 172 } 7.76 cents Residue 62.9
No good too brittle

R 12] 24 Sludge } mixes and bricks
4 Lime } fairly well hardens poorly
173.50 – 173 } 9 cents Residue 74.23
No good too brittle

R 11] 20 Sludge } mixes and bricks well
5 Lime } hardens well
176 – 174 } 8.1 cents Residue 48.8

R 12] 20 Sludge } mixes and bricks
5 Lime } well hardens
1 H_2SO_4 } 8.91 cents Residue 53.1
183.75 – 182.75

R 13] 20 Sludge } mixes and bricks
5 Lime } well hardens well
1 Sulfur } 9.22 cents Res. 62.
170.5 – 169.75

R 14]

18 Sludge } mixes and bricks well
5 Lime } hardens well
2 Rosin } 8.53 cents Residue 68.3

169.5 – 168.75

R 15

15 Sludge } mixes fairly well
5 Lime } bricks do. hardens well
Rosin } 8.03 cents
no good

182.5

R 16

20 Sludge } bricks moderately
5 Lime } hardens poorly
1 Rosin } 9.72 cents
1 Sulfur } no good
Residue 67.93

172.50 } 172.25

R 17

18 Sludge } bricks fairly well hardens
9 Lime } 9.82 cents
9 Slaked Lime } hardens well
to brittle no good

185.50. 185

R.

14 Sludge } wont brick
7 Lime
7 Lime

16 Sludge } bricks moderately well only hardens badly
8 Lime } no good
8 Lime } 7.48 cents residue

169.25 – 168

R 18

24 Sludge } mixes and bricks well, hardens well
8 Lime } badly no good
4 Lime } 10.76 cents Residue 61.54

182.50. 181.50

R 19

21 Sludge } mixes and bricks well
8 Lime } 9.40 cents Residue
13.5 Lime } hardens poorly
no good

135.15. 134.25

R 20

18 Sludge } mixes and bricks
4 Lime } no derability only
2 Lime } 7.14 cents
no good too brittle

135 – 134.2

15 Sludge } mixes and bricks
6 Lime } poorly
2 Lime } 7.09 cents
too brittle no good

mixes and bricks fully

15 Sludge
5 Lime } 11.6 cents
5 Molasses } too brittle no good

133,2

Molasses 5 } mixes and bricks well
Sludge 20 } 10.65 cents
Lime 5 } Residue 54.3%

139,2. 138.35 too brittle no good

R.15 Molasses 4 } mixes and bricks well
Sludge 16 } 8.52 cents
Lime 4 } hardens well
Residue 36.9%

146. 145

Molasses 3 }
Sludge 12 } 6.39 cents
Lime 3 } no good won't brick

18 Sludge
6 Lime } 10 cents
4 Molasses } no good won't bricks

18 Sludge
6 Lime
4 Molasses } won't mix the
10 Soda } aqueous soda
10 Water } solution dont
combine with the Sludge and lime

18 Sludge
6 Lime } the Soda put
10 Soda } in dry dont
combine with the Sludge and Lime

Anorganic Salts do not seem to combine with Sludge acid in the absence of water at ordinary temperatures nor on heating on the steam bath.

21 Sludge
Lime } won't brick
2 Nitric acid

Hydrochloric
and Sludge dont combine
at ordinary temperatures or on
the steam bath

20 Sludge
4 Lima } 9.76 cents
2 Tar
no good wont brick

10 Sludge
6 Tar } no good
4 Lima } wont brick

21 Sludge
5 Limer } 9.46
1 Tar } no good
wont brick

21 Sludge
7 Lime } 11.24 cents
12 Tar } no good
wont brick

None of the experiments with mixtures of Tar Sludge and Lima were successful.

Equal quantities of Sodiumsulphide and Sludge acid wont mix.

Sludge acid does not combine to a uniform mass with Caustic Soda in aqueous solution.

Sludge acid does not combine to a uniform mass with carbonate of Soda in aqueous solution.

Lima Sludge acid and ~~petroleum~~ nitric acid react quite energetically but do not form a suitable mass with good sticking properties for bricking.

R.16 24 Sludge
8 Lime
1 Potassium permanganate
1 water

184 132.7 Residue 61 0.3%
bricks well and hardens well

R17

21 Sludge
7 Lime
1 Permanganate
1 Water
} mixes and brick fairly well
hardens well

146.1 145.1
Residue 46.15 %

24 Sludge
8 Lime
1 Chromic Acid
1 Water
} mixes and bricks fairly well

no good too brittle

139.4 138.3
39 % Residue

21 Sludge
7 Lime
1 Chromic Acid
1 Water
no good wont brick

27 Sludge
9 Lime
1 Rosin
1 Sulphur
} 13.45 cents
wont brick

24 Sludge
8 Lime
1 Rosin
1 Sulphur
} 12.53
wont brick

21 Sludge
7 Lime
1 Rosin
1 Sulphur
} 10.81
wont brick

18 Sludge
6 Lime
1 Rosin
1 Sulphur
} 9.42 cents
wont brick

R 19

27 Sludge
7 Lime
1 Rosin
1 Sulphur
} 12.67 cents.

133.3 132.1 56.0 %
mixes and bricks fairly well
hardens well

1

18 Sludge
6 Lima
0,6 Rosin } 8.44
0,6 Sulphur
Resid. 47.29 %

132,8 ~~132~~ 132,1
mixes and bricks fairly well
hardens too brittle No good

R. 20

28 Sludge
6 Lima
2 Rosin } 13.09
1 Sulphur
Residue 47,69 %

127,8 126,3
mixes and bricks well hardens well

18 Sludge
4 Lima
1.50 Rosin } 8.53
0,60 Sulphur
Residue 41 %

129,7 mixes and bricks fairly well
128,9 hardens poorly too brittle
no good

Ferrocyanide of Iron in ammonia solution concentrated does contain with the Lime acid and Lima mixture

R. 21

28 Sludge
4 Lima
1 Molasses } 12.31 cents.
1 Sulphur
Residue 53,7 %

130,3 129,6
mixes poorly bricks very well
hardens well

21 Sludge
3 Lima
0.75 Molasses } 9.24
0,75 Sulphur

129,6-128,7
mixes poorly bricks fairly well
hardens poorly
no good

28 Sludge
4 Lima
1 Molasses } 11.74 cents
1 Rosin

Residue 42.5

124.3 123.5

mixes well binds fairly well
hardens poorly no good

21 Sludge
3 Lima
0.75 Molasses } no good
0.75 Rosin } worst brick

Regular proportions of mixture

Sludge Acid 30.
Lima pots. 10.

Residue 36,73 %

Regular proportions
Oil from separated Acid
3 and Sludge Acid.

before 4,6.
after
Residue 3,9 37 %

Separate acid 2#
and sludge acid.

120.5
46
4.0

before 9.
after 4.
Residue 5 55,5 %

Blue oil
and sluge

before 9.
after 3,5
Residue 4,5 50 %

These bricks are all fairly hard, but none so good as the standard mixture of 30 sludge + 10 lima (Harris)

Notebook, N-93-07-24

This notebook covers the period July-December 1893. It was used by Arthur E. Kennelly and an unidentified experimenter as a rough record book in the Galvanometer Room. The book contains notes, drawings, tables, and calculations regarding physiological experiments on the anesthetic and analgesic properties of electrical currents. There are also entries relating to cathetometer and meter readings and to tests of wire, a receiver for the phonoplex telegraph, a "noiseless" motor for an automatic piano, and the magnetic properties of various chemical solutions. Transcriptions of some of this material can be found in Arthur E. Kennelly Notebook #7. The pages are unnumbered, and one page has been removed from the back of the book. Approximately 140 pages have been used. A one-page note from Edwin W. Hammer to Kennelly, dated January 6, 1893, has been inserted into the book.

Meter for Aust. Prime C°

0.042" 0.055" × 3 = 0.165 + 0.020 = 0.185"

0.055" × 4 = 0.220 + 0.020 = 0.240"

12 wire × 6 = 72 turns all round

72 × 7 = 504' × 0.0058"

= .295" ÷ 4 = 0.074

Pl = 3.1 × 0.15 = 1.55 × 4 = 6.20

0.016" = 0.04

$\frac{0.05}{6.20}$ = 0.0133

Mmf $\frac{300}{0.0133}$ = 30000

Pl cur = 3000 × 72 = 216000 per amp

$\frac{6.2 \,|\, 216000 \,|\, 35}{27\,60}$

34000 cm-gm

$\frac{70}{360}$ $\frac{280}{500}$

34 cm-gm per [illegible]

The present motor with magnet in cam contains 525g with 6.1 amp at rad of 1.45 cm ~~77.8~~ $\frac{725}{36}$ 7.61 cm-gm = 12.5 cm-gm per amp.

$30000 \times \frac{1}{10} \times 140 = \frac{420000}{27} = 70$

Polar bore 1.658 0.027

Iron 1.628"

0.022

1.598"

1.600

Gross 0.240" × 0.190"

12

0.055

0.0062

72

434

4466

36

374

7.136

.503

.165

20. 22¾ commenced application
.29¾ apparent anaesthesia
.31 slight anaesthesia in
the finger & little in
the other surface of hand
21.00 pm also slightly in wrist
.30 stopped
Sensation returned almost immediately

8.26.0 Dr Olmsted

.42.0 slight anaesthesia over wrist
and end of hand
45.0 no paraesthesia no loss of
sensibility

.54.0 Dr Peterson recommended
2 mos
.57.0 anaesthesia distinct

21.07¼ Commenced with Dr Peterson
45.0 14.0 N pr sec about 3 mos

.14.0 No anaesthesia no paraesthesia
ceased application

.17.0 Commenced on Dr Peterson with
small alternator
¼ 200 r/pm

.19 Anaesthesia also tingling slight
in hand & fingers
palmar aspect of wrist
also anaesthetic

31. 21.20 11.00 pm placed apparatus in hand
22 very faint anaesthesia
.23.0 slight anaesthesia
.24½ temp sense not affected
.25 turned on full speed
perfect anaesthesia pain at max
partial anaesthesia. distinct
.26½ scarcely felt the warmth
of a lamp
.27.0 almost complete anaesthesia
complete restoration on reversing

21.30/4 hard copies sent to be
finished and bound
[illegible]
1.12/6 corrections in proofs
arrived 31.12.1/pm 4.

Cassiopeia 5-15 29th July 93

0	241.8	2	255.30	4	275.50	6	293.30	8	311.50
.1	2.62		9.14		6.37		4.11		2.49
.2	3.24		8.99		7.24		5.02		3.34
.3	4.24		50.83		8.11		5.92		4.30
.4	5.08		1.68		8.99		6.84		5.10
.5	5.90		2.52		0.85		7.75		6.00
.6	6.78		3.37		50.72		8.66		6.94
.7	7.54		4.21		1.59		9.57		7.90
.8	8.36		5.05		2.46		50.48		8.70
.9	9.18		5.90		3.33		1.39		9.60
1.0	250.00	3	266.75	5	284.20	7	302.30	9	320.5
.1	0.83		7.62		5.10		3.22		1.4
.2	1.66		8.50		6.00		4.14		2.3
.3	2.44		9.37		6.90		5.06		3.2
.4	3.32		10.25		7.80		5.99		4.1
.5	4.15		1.12		8.70		6.90		5.0
.6	4.98		2.00		9.60		7.82		5.9
.7	5.81		2.87		10.50		8.74		6.8
.8	6.64		3.75		1.40		9.66		7.7
.9	7.47		4.62		2.30		10.58		8.6
2.0	258.30	4	275.50	6	293.30	8	311.50	10	329.50

10	329.50	12	346.50	14	361.75	15.0	367.25		
	30.37		7.32		2.30	14	361.75	8.5	
	1.25		8.15		2.85	13	354.75	7.0	
	2.12		8.97		3.40	12	346.50	8.5	
	3.00		9.80		3.95	11	338.25	8.25	
	3.87		10.62		4.50	10	329.50	8.25	
	4.75		1.45		5.05	9	320.5	9.00	
	5.62		2.27		5.60	8	11.50	9.00	
	6.50		3.10		6.15	7	02.30	9.30	
	7.37		3.92		6.70	6	93.20	9.10	
11	338.25	13	354.75	15.0	367.25	5	84.20	9.0	
	9.07		5.65			4	75.50	8.70	
	9.90		6.15			3	66.75	8.75	
	40.72		6.95			2	58.30	8.45	
	1.55		7.50			1	50.0	8.30	
	2.37		8.25			0	241.8	8.2	
	3.20		8.95						
	4.02		9.65						
	4.85		60.35						
	5.67		1.05						
12	346.50	14	361.75						

Outside [illegible] from 3rd motor
15th July 93

85 bell passages in 1 min 4 cells 2.677
" " " 40.5 turns per passage

Regular for motor

light 4 cells	2.1	2.2	68 bell passages
light 3	2.0	1.7	51
bell 3	2.9	1.5	30.25

Over

light 3 cells	1.80	2.1	64
	2.70	1.7	38
	[illegible] 2.6	without bell	

6 file motor	2.00	1.7	10.5
	3.0	1.7	7.3

64.5 bells to one bell passage

another	2.5	1.7	10.25
			6.9
	3.8		8.7

15 15.5 / 19 8.7

5.7 / 6.0 / 5

[illegible] July

30.16 Dr Edwards commenced two fingers in hot water

Spent 1400 ohms [illegible] on anaesthesia

28.17 Low [illegible]

.19½ 1500 [illegible] sensation slightly dim

.21 [illegible] double analgesia

.22 application ceased

[illegible] with [illegible]

.27 [illegible] complete analgesia and anaesthesia, extend upwards at 2" above wrist band

.30 [illegible] return

.30½ Recommenced strong anaesthesia and analgesia superficial

commenced at a lower frequency for

.34½

.35½

36.
36½ Throughout

Paraesthesia very marked

Dr Alwood had same current as last with marked analgesia and anaesthesia

8.41 electrode over [illegible] of 8th found more other [illegible]

8.46 slight anaesthesia

.47½

Unable to buy [illegible] properly owing to hyperaesthesia

Employing Rheostat and secondary barrels to interrupting electrode showed different contraction in extensor indicis with the two poles one much stronger than the other. This was [illegible] in three observations

It was noticed in lower dyes with small alternator

It did not occur at all with large alternator.

478		479	482	480
0	0	0	0	0
2.5		20.6		21.9
5	43.7	43.3	45.3	44.5
7.5		65.9	67.7	66.7
10.0	88.5	88.25	91.1	88.4
12.5	108.9	109.11		108.9
15.0	125.3	127.4	125.3	125.8
	V			V

483	484	485
0	0	
21.5	22.0	20.7
43.3	43.8	43.4
64.6	65.8	65.1
86.4	87.6	87.7
108.0	108.1	108.3
125.3	124.4	125.5
V		V

488	486	473	489	494
0	0	0	0	0
21.6	22.6	22.4	21.4	21.4
43.5	45.3	43.7	42.7	43.1
65.5	67.2	65.6	63.7	64.9
87.4	89.0	87.4	85.5	87.1
107.6	108.9	107.4	107.2	108.9
123.6	125.4	123.9	125.3	123.6
	V		V	

43.7	88.5	20.6	66.7	108.9
44.4	88.4	21.9	67.2	105.9
45.3	89.0	22.6	63.7	107.2
42.7	85.5	21.4	64.6	108.0
43.3	87.1	21.5	65.1	108.9
43.4	86.4	20.7	27.3	41.8
22.8	87.7	8.7	.54	8.3
43.8	5.6	21.7		
	88.8			

27 30
9 00
264 0
11 | 1213
1.11

2 00
30
33 00

388

P. & G. cold 5480 w TB 23.3°C

1st Cement on at 10.55 — 920 w added to grid in 11 — 760 w at 11.45 — 5820 @ 15.0 — 1401 Rhine

109 avail — 505 @ 16.25

1854 vole

480 w @ 17.55

11.06 — 2495 w added to grid in 11 — 2435 @ 16.45

2430 @ 17.90

11.11 — 910 w added to bay grid — 925 w @ 16.50

cv. 200,000 bar — 930 w @ 17.22

11.42 — 170 w added to 600 w — 155 w added to 600 w

155 w @ 17.36

5500 w on f. 9

2745
920
3665

2745
480
3225

1.136

388 | 136

35.05°C 87

2495
2745
52.40

2745
2420
5165

1.0640 3.35

2745
420
3165

2745
930
3675

1.0057 1.5°

2745
420
3165

2745
455
3200

1.0050 2

13.5
0.5 P g 13.5
0.5

2.42 = 1.21 0.8264
6.5 0.0153
0.6734

R = 0.6734 = 6.12
12.57

7.65 1000
0.6734

R =

34 X 35.5 without fan
19.5 X 35.5 with fan

19.5
71
195
1365
13845
692

28 X 35.5 without fan
17.5 X 35.5 with fan

17.5
175
245
35
62.25

1420
1050
370

1.5 low 0.55 D
0.75 d

0.1 mm
0.076 mm drain silk cond
2.42 low
39.20 cogh
40.5 warm

glass beaker 13.05 ent
mass 0.38 g

thermometer + bulb 79 g

full 181.0
164.4
16.6 g

79.0
16.6
16.4

$R_2 = 4.25$

$= 6.2$ 0.2

4.10 1.30 0.3

$\frac{4.25}{4.10}$ 1.30

$\frac{4.25}{4.10} = 1.038$

77 cm 0.394 m 25°C

0.058 × 0.010 0.0058

$\frac{394}{77} =$ 2.68

0.6820

$\frac{10}{3.10} = 0.03$

$P = 30.6$ watts

$\frac{d\rho}{\rho} \left(\frac{1}{r} - \frac{1}{R}\right)$

$\times \frac{1.25}{1.25} = 30$

$= 55$

17.13 current 2.1 [illegible]

1.15 76°

17.43

99°C 24.8°

2 × 1.125 = 8.10 amp

17.58

101.5° 25.0°C = 76.5

1.105 × 2 1.11 amp

1.28 watts

$\frac{76.5}{2.56}$ 6.12

$\frac{765}{30.6} = 25$

$\left(\frac{1}{r} - \frac{1}{R}\right) = 1$

$d\rho = \frac{\alpha}{4\pi r^2}$

$= \frac{\alpha\, dr}{4\pi r^2} = \frac{\alpha}{4\pi}\left(\frac{1}{r} - \frac{1}{R}\right)$

$e - jl$

$l = \alpha \mathcal{T}$

$$\gamma = \Gamma\left(1 - \varepsilon^{-\frac{\mathcal{T}}{\tau}}\right)$$
$$= \Gamma\left(1 - \varepsilon^{-\frac{\mathcal{T}}{\tau}}\right)$$
$$= \beta \frac{\mathcal{T}}{\tau}\left(1 - \varepsilon^{-\frac{\mathcal{T}}{\tau}}\right)$$

WITH THE ELECTRICIANS.

The city statistician of Chicago reports that there are 150 establishments for "electric lights, works and materials" in that city.

The Western Electrician rejoices in the fact that the erection of an elevated railroad in Chicago is now operated by the use of electrically transmitted power. It is to be a north side road.

The tallest building in Stockholm, Sweden, is the large iron lattice-work tower of the central telephone exchange. Myriads of wires radiate from it, distributing the city. Every one in Sweden uses the telephone, and uses it, moreover, very much.

A single rail electric railway is said to be projected between Reserve and Cortland, via either Albion or Medina, to practically test Capt. Bliss' Bicycle Railway patents. The invention has been tried on a short test line, and has been found, it is said, to work in a perfectly satisfactory manner.

One of the largest electric cranes in the world is now at work [illegible]

0.63 amp. between Sp. 1 & 0.
0.82, 0.505 9
0.55 15

0.62	0.344		
0.92	0.546	0.462	9.5
1.01	1.020	0.636	12
1.06	1.124	0.720	15
1.11	1.232	0.845	20
1.17	1.369	1.085	28
1.08	1.166	0.760	19
1.03	1.061	0.664	13.5
0.975	0.950	0.553	11.3
0.95	0.903	0.506	10
0.63	0.397	~~0.506~~	2

0.64	0
0.925	0.5
1.030	14.5
1.040	18.5

0.66	372		0	0
1.030	1.061	0.850	8.4	1
1.06	1.124	.769	11.2	2
1.11	1.232	.660	13.6	3
1.17	1.369	.597	19	4
1.24	1.538	[illegible]	25	5

Ammeter 15 amp. &
ammeter 0.9, 15 &
{Tues, Aug. 12. a.m. '93} — 15 D.

Comparison of the two ammeters,
Even scale on 15 ampere meter, —
comparing with the 15 on D.

1st)		2nd)	
1	ampere	0.9	
2	"	2	
3	"	2,8	
4	"	3,8	
5	"	4,9	
6	"	5,9	
7	"	6,9	
8	"	7,9	
9	"	8,9	
10	"	10.	
11	"	10,9	
12	"	12.	
13	"	12,9	
14	"	14	
15	"	15	

One scale meter,

Three scale meter

Note. No 1 is the meter having the three scales & no 2 is the single 15 ampere meter!
specified by (1st) & (2nd).

No. of revolutions of meter according to current strength

At 1 ampere current 1¾ revolutions per min.

at 2	amperes	current	4 rev. per min.
at 3	amperes		6 rev. per min.
at 4	amperes		8 rev. " "
at 5	amperes		10 " " "
at 6	"		12 " " "
" 7	"		13½ " " "
" 8	"		16 " " "
" 9	"		19 "
" 10	"		20½ " " "

~ Monday Aug. 14 '93 ~

No. of revolutions on even scale of amperes.

At 1	amperes	2 rev. per min.
" 2	amperes	4½ " " "
" 3.3	amperes	6½ " " "
" 4.1	amperes	8 " " "
" 5.3	amperes	10½ " " "
" 6	amperes	12¾ " " "
" 7.6	amperes	13½ " " "
" 8.6	amperes	16 " " "
" 9.4	amperes	18 " " "
" 10	amperes	19¾ " " "
" 11.7	amperes	22¾ " " "
" 12.4	amperes	23 " " "
" 13.2	amperes	26 " " "
" 14.5	amperes	26¾ " " "
" 15.5	amperes	26¾ " " "

Test of Motor Metric, Thurs. Aug. 17.

Ampere	D	Revs per min
1.	0	"
2.	2.	"
3.	4.	"
4.	6 7/15	"
5.	8 4/15	"
6.	10 1/30	"
7.	12 11/30	"
8.	14	"
9.	16	"
10.	18 1/2	"
11.		"
12.		"
13.		"
14.		"
15.		"

14. 1 revolution of the dial is equal to 140 revolutions of the cylindrical weights.

C	Nom	
10.0	17.7	1.77
9.0	15.8	1.76
8.0	14.0	1.75
7.1	12.5	1.77
6.0	10.7	1.77
5.0	9.0	1.80
4.0	7.0	1.75
3.0	5.3	1.73
2.0	3.5	1.75
1.0	1.5	1.50
0.5	0.6	1.60
15.0	26.0	1.73
15.0	26.5	
15.0	25.5	
19.	32	1.68

$\frac{1/32}{12}$ | 1.68

$\frac{1}{25.0}$

2

Bombay [illegible] 19th Septr

Date			
1	95w	26	95.5w
2	95	27	100.5w
3	95	28	97.5
4	99	29	96w
5	99	30	99
6	96	31	97.5
7	95	32	96.5
8	95	33	97w
9	99	34	98w
10	97	35	96w
11	95	36	95w
12	94	37	97w
13	97	38	96w
14	96	39	95.5
15	95.5	40	97w
16	97	41	97w
17	95w		
18	97.5		
19	96		
20	98w		
21	97w		
22	97w		
23	95w		
24	95w		
25	96w		

mean 95

Bolide [illegible]

Kymograph [illegible] 12h Cycle

Base [illegible]

-5	2069	11498	2066	588
-4	2069			
-3	20.53	1522		531
-2	2021	1484		617
-1	1804	1195		600
0	~~4435~~ ~~4755~~ 4941	3718		1233
	4953	2981		1972
	read from index 18 4835	lower plate ~~2254~~ 2254		2581
	4882	1841		3041
	5014	1794		3220
5	5378	1730		3648
	5112	1035		3777
6	5391	1375		4016
7	5314	1417		3897
8	5172	1970		3202
9	5788	2843		2295
10	5521	3955		1566
11	5651	4788		863
	read from upper line 5446	4862		604
13	5674	5040		634
14	5735	5045		690
15	5238	4538		700
16	5233	4197		1036
17	5276	3576		~~1700~~ 1680

18	upper line 5561	3072	2489
19	5572	2504	3068
20	5665	2310	3355
21	5891	2234	3657
22	5754	1961	3793
23	5758	1657	4101
24	5691	1668	4028
25	5577	2208	3369
26	5578	2907	2671
27	5511	3668	1843
28	5516	4303	1213
29	5444	4733	731
30	5532	5017	515
31			
32			
33			
34			
35			

	Base	Curve.			
−5	5182	4595		587	588
−4	5352	4843		509	531
−3	5457	4841		616	617
−2	5806	4966	→	940	654
−1	5745	4545	169	1245	1233
0	5830	3833		1997	1972
1	5815	3237	147	2568	2541
2	6019	2723	→	3296	3041
3	5471	2187	→	3284	3535
4	5526	2094	→	3432	3646
5	5472	1784	→	3688	3777
6	5500	1488		4012	4015
7	5728	1827	1798 694	3991	3897
8	5774	2617	→	3157	3206
9	5761	3535	→	2226	2245
10	5635	4040	164	1698	1566
11	5753	4889		864	843
12	5991	5388		603	604
13	5874	5350	→	524	534
14	6017	5460	→	557	600
15	6265	5555		710	700
16	6343	5280	→	1063	1036
17	5533	3843		1690	1694
18	5836	3349		2487	2469
19	5353 ~~5752~~	2311 ~~2960~~		3042 ~~3692~~	3068
20	5638	2392	→	3246	3355
21	5830	2273	→	3557	3687
22	5575	1767	1681	3808	3793
23	5672	1574	199	4098	4101
24	5752	1745	30	4007	4023
25	5747	2405	→	3342	3364
26	5830	3176	125	2654	2671
27	5842	3979	106	1863	1843
28	5865	4613	→	1252	1213
29	5860	5152	→	708	721
30	5936	5421		515	515

	Back	Curve	D
-2	5445	4596	849
	5446	4580	866
2	5556	2519	3037
3	5589	2309	3280
4	5622	2100	3522
5	5676	1994	3682
8	5725	2556	3169
9	5777	3532	2245
13	5884	5256	628
14	5809	5219	590
X 16	5871	4850	1021
20	5553	2513	3370 Curve
21	6002	2464	3538
25	5974	2420	3554
L 28	5903	2606	3369
29	6050	4742	1161
		5315	735
X 16R	5875	4875	1000 Correct
L 28	5931	4746	1185
28	5913	4738	1175

Outside Readings

984	365	5-1835	(27)	11224	386	
1019	352	4 (1844)	2777	11562	308	
1171	372	3087	(23)	(11949)	(5486)	
2108		3487			387	5722
2403 (R)		3769	382		361	6083
2773		0- 4136	367		328	6411
3111	(1)	4487	351		348	6759
3424	361	4788	301		311	7070
3746	2985	5111	323		329	7399
4[illegible]	3238	- 5522	411		(30)	7728
4464	2501	5826	304		327	
4751	2918	6164	338			
5112	2149	6469	305	Curve		
5463	2500	6822	353		9575	8912
5829	1[illegible]	7187	359		10198	9206
6109	(10) (11)	7467	286		10579	9616
6485	5522	7852	385		10852	9919
6806	5743	8163	311		11232	(8954)
7167	6294	8522	359		10269	9113
7537	6294	8904	382		8890	9453
7854	6491 (18)	9208	334		8401	9764
8171	7094	9525	317		9132	10095
8499	7536	9858	333 (30)		9483	10446
8839	7626	10169	331			
9199	8336	10552	383			
9521	(20) 8448	10888	336			

2nd Lot

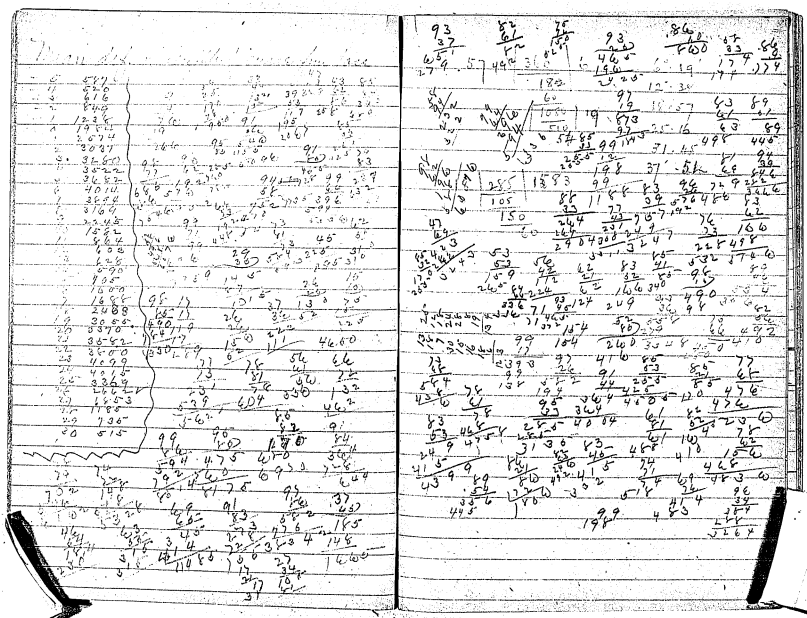
1	1385		1232	110 71
2	339		339	340
3	372		372	1137
4			1463	963
5	387 (3)			
6	295 (4)	1113	1063	1094
7	370 (4)	262	34	
8	395 (4)	1389		1191
9	319 (4)	1389	1222	
10	322	301	227	311
11	426	273	1463	1222
12	392	317	962	963
13	317	304	1459	1459
14	381	338	1263	
15	385	385	347	
16	384	384	2924	1194
17	382	382	962	2316
18	376	376	1941	
19	371	371		
20	361	311		
21	370	369	2916	
22	319	384		
23	327	304	1461	1246
24	325	379		30
25	348	348	1277	
26	350	347	2253	2246
27	322	353		2243
28	354	336	1459	1093
29	323	323	1263	
30	387	334		
31	303	387	2222	
32	360	326	2253	1322
33	359	359	164	311
34	311	345		1263
35	337	377	1459	1222
36	381	352	329	1190
37		344	1263	
38			2253	1246
39			1459	1263
40				1190
41	1264			
42	349			
43	1263			
44	1222			
45	1190			
46	1246			
47	1263			
48	1222			
49	1190			
50	1246			
51	1263			
52	1222			
53	1190			
54	1246			
55	1263			
56	1222			
57	1190			
58	1246			
59	1263			
60	1222			

Back

1	0	1	0	0
2	364	2	364	376½
3	728	3	734	734
4	1145	4	1192	1139½
5	1420	5	1416	1425
6	1810	6	1780	1796½
7	2148	7	2139	2161
8	2461	8	2438	2448
9	2788	9	2788	2740½
10	3209	10	3169	3167
11	3501	11	3493	3467
12	3815	12	3877	3871½
13	4149	13	4216	4092½
14	4500	14	4469	4485½
15	4768	15	4828	4844
16	5122	16	5114	5130
17	5443	17	5509	5516½
18	5785	18	5813	5846½
19	6205	19	6169	6188½
20	6474	20	6537	6532½
21	6791	21	6852	6852
22	7208	22	7172	7172
23	7596	23	7513	7524½
24	7876	24	7816	7846
25	8136	25	8199	8217½
26	8545	26	8535	8537½
27	8912	27	8871	8891½
28	9285	28	9288	
29	9676	29	9996	9996 Change
30	9919	30	3158	3181
31	12368 Change	31	3369	10193
32	8763 = 12000	32	3790	10621
33	8490	13945	4058	10889
34	8801	11659	4406	11183
35	9121	11892	4712	11189
36	9453	11941	5042	11497
			3395	

Brierley from Lot 22.

37	295½	349	22	9220
38	2550		23	9476
39	3062	356	24	9831
40	3417	355	25	10162
41	3772	331	26	10500
42	4256	382	27	10848
43	4421	355	28	11231
44	4803	382	29	11533
45	5185	382	30	11889
46	5461	356		



Fast zero wave

1	.04 x .03 =		.0012
2	.14 x .10 =		.0168
3	.19 x .14 =		.0266
4	.25 x .34 =		.1020
5	.32 x .44 =		.1408
6	.39 x .53 =		.2067
7	.40 x .62 =		.2666
8	.47 x .7 =		.3290
9	.50 x .77 =		.3850
10	.58 x .80 =		.4640
11	.60 x .91 =		.5946
12	.65 x .84 =		.5460
13	.62 x .98 =		.6076
14	.64 x .99 =		.6336
15	.67 x .70 =		.4690
16	.71 x .99 =		.7029
17	.72 x .91 =		.7646
18	.83 x .95 =		.7885
19	.85 x .91 =		.7735
20	.85 x .84 =		.7140
21	.83 x .79 =		.6557
22	.61 x .73 =		.5913
23	.79 x .64 =		.4672
24	.62 x .85 =		.5410
25	.57 x .40 =		.2280
26	.39 x .35 =		.1015
27	.26 x .25 =		.0650
28	.15 x .15 =		.0225

29	.04 x .04 =		.0016
30	.06 x .06 =		.0036
31	.17 x .17 =		.0289
32	.26 x .26 =		.0676
33	.36 x .37 =		.1332
34	.46 x .50 =		.2300
35	.56 x .61 =		.3416
36	.66 x .72 =		.4752
37	.73 x .77 =		.5621
38	.78 x .81 =		.6318
39	.85 x .83 =		.7055
40	.91 x .84 =		.7644
41	.95 x .85 =		.8075
42	.95 x .85 =		.8080
43	.99 x .86 =		.8514
44	.10 x .86 =		.8600
45	.99 x .86 =		.8514
46	.99 x .86 =		.8342
47	.95 x .85 =		.8075
48	.91 x .83 =		.7553
49	.85 x .82 =		.6970
50	.79 x .74 =		.5846
51	.72 x .74 =		.5328
52	.65 x .69 =		.4485
53	.55 x .63 =		.3465
54	.46 x .54 =		.2484
55	.37 x .45 =		.1665
56	.27 x .34 =		.0918
57	.16 x .27 =		.0432
58	.09 x .09 =		.0081

1	-1.00	×	+.03	=	-.0300
2	-.98	×	+.12		.1188
3	.97		.19		.1843
4	.93		.25		.2325
5	.88		.33		.2904
6	.83		.39		.3237
7	.77		.43		.3311
8	.69		.47		.3243
9	.62		.5		.3100
10	.53		.53		.2809
11	.42		.56		.2352
12	.33		.57		.1934
13	.21		.62		.1302
14	.10		.64		.0640
15	.01		.67		.0067
30	+1.—		-.04		.0600
17	.99		.17		.1683
18	.97		.26		.2522
19	.93		.37		.3441
20	.89		.50		.4450
21	.82		.61		.5002
22	.75		.72		.5400
23	.65		.77		.5236
24	.61		.81		.4941
25	.53		.83		.4399
26	.44		.84		.3696
27	.03		.85		.2595
					+.4930

16	-		+.11	× +.71	= .0781
			.22	.77	.1694
			.32	.83	.2656
			.41	.85	.3485
			.52	.86	.4472
			.61	.83	.5063
			.69	.81	.5589
			.76	.73	.5548
			.83	.62	.5146
			.89	.57	.4539
			.94	.39	.3666
			.96	.26	.2496
			.98	.15	.1470
			.99	.04	.0396
			7.10		+ 4.6
					+4.9939

43		+.21	× -.50	=	-.1050
		-.56		=	-.0946
44		+.01	-.86	=	-.0086
					-2.617
					-7.4630
					-7.7247

45 = 0.1000	× .46	= +	.0860
	.21	.46	.1806
	.32	.85	.2720
	.45	.83	.3735
	.52	.82	.4264
50	.62	.78	.4836
	.71	.74	.5254
	.76	.69	.5244
	.82	.63	.5766
	.89	.54	.4806
55	.93	.45	.4185
	.96	.34	.3264
	.99	.21	.2079
58	1.00	.09	.0900
			7.65
		+	49.119
		or	4.6929
			49.6048
			−7.7(8464)
			+41.8601

24.8331 sin + 1.8601 cos.

7.0012

$\frac{49.666}{58} = 0.8564$ $\frac{1.8601}{24} = 0.0774$

10°	0.1736	0.1487	.011
20°	0.342	0.293	.022
30°	0.50	0.428	.032
40	0.643	0.551	.041
50	0.766	0.656	.049
60	0.866	0.742	.055
70	0.940	0.805	.060
80	0.985	0.844	.063
90	1.0	0.856	0.064

1.6510

.8982

204.5) .7228 | .8982 .8371 .0611

.8982 | 8716

196.5

106.5 × 0.426 = 0.8370

.8982

1658

.8982 | 7324 1658 | 8156 0.0[illegible]

13.7343 = 0.4373π = [illegible] ordinate

$K\pi$ = 0.4736π = 0.9472

Test of am. meter Sept 15th '93

no. of ampères	no. of rev. per min.
4.2	$1\frac{13}{47}$
5.2	$2\frac{14}{29}$
6.1	$3\frac{3}{5}$
7.0	$4\frac{27}{53}$
8.0	$5\frac{5}{14}$
9.2	$6\frac{6}{11}$
10.2	$8\frac{4}{7}$
11.1	$8\frac{7}{17}$
12.0	$9\frac{3}{8}$
13.3	$10\frac{10}{27}$
13.9	$10\frac{6}{7}$
14.3	12

14.8	12½

Tests of Annulus (continued) Sept 15

No. Cam.	No. rev.	Time.	Rev per min
2	1	61	.98+
3	2	60	2.0
4	2	64	2.14+
5	4	58	4.13+
6	5	56	5.35+
7	7	63	6.66+
8	7	53	7.92+
9	10	64	9.37+
10	10	56	10.7+
11	12	66	10.9+
12	12	60	12.0+
13	14	65	12.8+
14	14	55	13.45+
15	15	60	15.—
16	15	60	15.—
17	17	60	17.0
18	17	59	17.28+
19	18	59	18.3+

Continued

20	19	60	19
21	20	60	20
22	21	60	21
23	22	60	22
24	22½	60	22½
25	23	60	23
26	24½	60	24½
27	26	60	26
28	27	60	27
29	27	60	27
30	28	60	28

19. IX - 93.

Right amp. circuit

O.H.O - this wk.

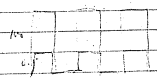
bit write on wk

60 - lmp

50 × 0.5 = 25 volt

50 × 0.5

= 25 V



0.25

50 × 0.25 = 12.5 volt

100 × 0.5 = 50 = 25

100/2 × 0.5 = 50 × 0.25 = 12.5 volt

Test of a Thomson Watt-meter, Sept 21 '93

Amperes used			rev	time
1/4	per minute 1.66			
1/2	2		2	60 sec
1	2.47	2.916	2	46 "
2	4.25		3	42 "
3	5.55		5	54 "
4	7.0		7	60 "
5	7.8		8	61 "
6	9.47		9	57 "
7	10.9		10	55 "
8	12.2		11	54 "
9	13.3		12	54 "
10	15.0		14	57 "
11	16.0		16	56 "
12	17.47		16	55 "
13	18.9		18	57 "
14	19.6		20	61 "
15	21		20	57 "

Amp.	Rev.	Time
16.3	21.7	60 sec
11.7	17	60
8.4	8	60
5.85	8	60

3	5	60
3	5.5	60

Same lots Light = 2

4 amp rev in 60 sec @ 1.666

1.0	2	57	= 2.916
2.0	4	60	= 4.
3.0	5	59	= 5.07

2.95	5.2	60 sec
2.0	3.75	60
1.5	2.6	60
0.43	1.6	60

Test of Thomson's Recording Watt Meter, Sept 23rd 1893

Amperes	Rev.	Time	Revs per Amp
.5	1	38	15.7
1.0	2	34	2.35
2.0	4	62	3.87
3.0	6	59	5.07
4.0	7	64	6.56
5.0	7	56	7.5
6.0	9	60	9
7.0	[illegible]	59	10.1
8.0	12	62	11.6
9.0	12	58	13.0
10.0	14	59	14.2
11.0	15	57	15.7
12.0	16	56	17.1
13.0	17	57	17.8
14.0	18	57	18.9
15.0	20	59	20.3
16.0			
17.0			
18.0			

Meter prices for October, sent out. Weight of each.

1.	36.591	25.	42.916
2.	35.207	26.	43.784
3.	46.784	27.	45.148
4.	48.047	28.	37.847
5.	38.986	29.	47.278
6.	38.155	30.	47.610
7.	46.838	31.	48.770
8.	38.555	32.	49.726
9.	46.696		
10.	33.977		
11.	34.890		
12.	38.150		
13.	39.774		
14.	47.325		
15.	38.178		
16.	46.880		
17.	46.647		
18.	34.954		
19.	44.588		
20.	47.602		
21.	46.849		
22.	46.392		
23.	38.127		
24.	39.449		

Kinks in wires. Oct 6 to 1893.

Platinoid wire 10% Iridium { Res. 4175 ohms (including leads.) Length 747 cm.

(Robertson Cornish) After drinking (heated while hot) (Central times): - Res = 399.7 ohms

Kinked slightly more; - Res = 400 ohms

[illegible] (Central times): - Res = 400.2 "

(Daughter left for Hanover) " " " - " = 400.0 "

" " " - " = 401.0 "

" " " - " = 401.2 "

Heated by electricity current (Wire stretched about magnetic accidentally) while hot. 402.0 "

(Rest from Hanover and electricity discharged)

16.75°	16.75
25.0	11.75
42.2	17.2
48.4	6.2
58.1	10.7
67.2	9.1

Repeated again - Res = 404.3 "

" " = 405.0 "

Oct 9 to 1893.

2.845 ohms res. } Platinoid sample
77 cm. length. }
.036 dia = .0027 ohms

$\frac{30.45}{77} \times 2.845 = .1128$ " per foot

0.01127 " dia = 70 ohms per "

10° = 70.0 ohms

$0.350 \times 3.1416 = .0785$

Total length = 549.78 = 550 feet

Another wire - 0.016 - 0.0104 " diam

3.915 " 71 cm = 0.055 " per cm

= 1.675 " per foot

950 ohms × 1.67

$71 \overline{)3.915}$ (.055
365
100

0.0057" 19.33 " per inch $\frac{1933}{58.0}$

1750 ohms of wire × 4.6 "

Oct 16 1913 Chang Lab.

Kinks produced in air, water, oil and vacuo.

Plat-10% (medium) wire test for showing kinks. Then in order German silver, copper. Kinks produced in air & in water. Also when silk wound in air. Immediately upon forming upon surface of liquid the wire sinks (or nearly always) probably owing to surface tension produced by impurities or by adjoining liquid.

Natural plane of Plat-Ir wire produced kinks perpendicular to plane of flat surface.

Kinks produced when surface of liquid sinks or wire is raised towards plane of said surface.

Oct 17 1913

Plat-Ir wire & Plat-wire in air. Plat-Ir kinks most decidedly. Time to kink — copper wire showed no change.

10 Plat-Ir (2) German silver (3) Plat wire in air.

Plat-wire kinked perfectly.
Copper " " lib.
German silver " none.

Plat-Ir wire; l = 470 cm dia = .0060
Res = 26.0 ohms.

German silver; l = 46.6 cm. dia = .01025
Res = 14.23 ohm

Copper wire; l = 28 cm dia: 0.005
Res = 2.25 ohm.

~~Plat-Ir wire l = 41 cm dia 0.105~~
~~Res = 20.43 ohm~~
~~German silver wire l = 50 cm dia 0.105~~
~~Res =~~

Plat-Ir wire l = 41 cm. dia 0.105
Res. 17.50

German Silver l = 50 cm dia. 0.105
Res = 20.82

Two of these samples were included in resin with a portion of Cu wire 0.005 cm. dia. The Standard wire

used first on this occasion for first time. C. kicked strongly. The wires could not be kicked till C. melted. Afterwards G.S. wire could then be kicked over Pt-Ir wire not at all.

Loops given of Pt Ir wire, then third alone and kicked under passage discharges.

C. then discharges kicked strongly fairly.

" " " "

65

65 ⊖ 1/9 720

6900 25 / 5732 110

18th Oct. 03

Pomp. [illegible] candle back 4½
Right out 5½"
" in 1½"
Breath out 5/16"
" in 4/16"
Debt out 4½ [illegible] feet
" in
0.345 g
Bu. [illegible] out = 18 inches
Bu. [illegible] out
Magnet spirits 15° 35-50
" acid 20° 35-55
boot filled Salt spirits 15° 35-50
" Plumbago " gravity 35-infin.
Auditor Insp.
Right out
" in
Middle out
" in
Left out
" in
Mean.
Left [illegible]
filled Camphor [illegible] 45-60-90-60
" NaOH 2 spirits .10-50

boot filled Potass Bro. mag 10-35-
Sodium Sulphate mag 20-35
Mutter Tincture "Plumbago
Potass Tartrate [illegible] 12 [illegible]
Epsom Sulphate 65 = 45
filled Sugar 45 = 36 (11-79)
" Sodium Phosphate 15-35 = 10
" Glauber Salts 40-110 = 70
" Sodium Sulphate 50-95 = 45
" Potass Phosphate 30-65 = 35
" " Bromide 12-45 = 33
" Mag SO 45-91 = 43
" Chloralhydrate 32-72 = 40
" Camphor 14-95 = 81
" NaCl 35-90 = 55
" Ammonium Tartrate 30-72 = 42
" Carthamin 1-15 = 25
" Mono Cu Copper 15-90 = 72
" Cuprum Sul Sulph Fus. mag (1 sur. mb. not mon. sach.)
" Copper Per Mag. an 84-135 = 94
" Cupr-Sulfo-Carbol 45-110 = 55
" Copper Phosphate 15-38 = 55
" Stannum Metal Mag. 3 sur. not mixed.
" Cuprum Chloric 17-65 = 51
" Cupr-Citric 25-110 = 55
" Bromide Copper 15-50 = 25
" Cuprum Nitr fused 45-80 = 85

21.6 15-7

Cupr. Formicic	30-75 =	45
" Iodat	17-55 =	41
X Perchloride Copper	6-16 =	16
Copper Nitric	7-50 =	42
" " hydratic	60-155 =	155
X Cuprum Oxalic	7-20 =	12
Iodate Copper	28-110 =	82
Cupri Citricus	52-80 =	28
Cupric	35-50 =	15
Cuprum	51-95 =	44
Barium Carbonic	45-67 =	22
Cimicarin	17-50 =	33
Cupric Sulphas	10-30 =	20
Hydride Copper	43-60 =	37
Carynum Oxydat (Cerium)	30-85 =	55
~~Cuprum Iodatum~~		
~~Cuprum Oxydat Nigrum~~ nec		
Cracca. Sal. Chrom. Pur.	45-75 =	30
Cuprum Iodat	15-35 =	20
Tormentil Iodat	10-40 =	30
X Plat. Cyanatetally	5-23 =	18
~~Cuprum~~	~~10-30~~	~~20~~
Cu "	0-14 =	14
Thallium "	0-30 =	30
Aurum " Simply mag.		
Manganic "	25-150 =	125
Calcium "	=	70

Cetrul Iodat (liquid)		
Strychnine "	0-30 =	30
Lithium " (half liquid)		
X Plumb " dia. mag.		
~~Barium " 0-12 = 12~~		
Magnes " sulphur nitric		
Ferrum " simply mag.		
Silicium " 14-50 =		36
Juca. " 10-30 =		20
Hydr. Bijodat Pur. 35-65 =		30
Baryum Iodat (sulphur liquid)		
Mercur " 15-70 =		55
~~Argentum Sulphuric~~		
Cadmium, iodide - lutes 1 nr		
alt sulpho Carbamid dia. mag.		
Potass. iodas - lithi nr cal nr		
Sulphur iodid - ars nr		
Aconitin nitric amorph 2 nr		
" sulphuric 19		
" amorph four fulv 21		
Acid Tarrochloric	70	
" Boracic (fund)	90	
" Tartaric	22-50 =	28
Acid Citric	40	
Ammon. Sulphocyanate	15	
Aluminum Bromide	20	

Albumin	45
Alumina oxalic	85
Alumen Chromate	43
Acid Tiltanic	30
" Tannic	56
Alumen Bromide	15
" Phosphate	35
" Benzoic	30
" Acetic, Dec.	27
" Nitric	27
" Chloride	48
Ar Oxygen Calc. Simply mag.	
Alumen Sulphate	30
Alum pure common	3 pur did not more
Alumen Kalic, Pur	15
" Natric	15
Alumen (Alum)	30
" Sulfuric	15
" Dabate	35
Acid Citric	wk. pur
Barium Bromate	50
Barium Nit.	
Barium Chromic	35
Barium Chlorate (cryst)	Simply mag.
" Chloride (Pure)	33
" Hydro oxydate	100

Barium Acetic	19
Bebri Caustic (cryst)	20
Barytes Carb	10
Cuprum Reduct.	simply dec. mag.
" Arsenicus	" mag.
Cupr Acetate	60
Cupr Ammoniated	87
Cupr Ammon Sulphate	100
Cuprum Metal	35
Barium Sulf. Trace Pur	15
Cuprum Borasic	100
" Monochloride	45
" Bromate	
" Acetate (cryst) C.P.	140
Cupri Sulphas C.P.	35
Cuprum Arsenicic	35
Verdigris (powdered)	simply mag.
Cuprum Dichloride	107
Carbon - H_2SO_4 on Sugar in cold	85
" - Phos. anhydride on Sugar	40
Copper Carbon	88
Cocain. Hydrochloric	25
" Hydrobromic, Christ	32
Codein Hydrochloric	85
Colocynthidin (Caulin)	74
Cocain Nitric	Tetro cocain nitrate
Cocain Hydrochloras	simply mag. 15

Codeine White	42
" pure	Dis. Mag.
Colchicine Purissimum	about 20
Codeine Hydrochlorate	32
" Iodohydrate	35
" Sulphate	36
" Phosphate	20
Cerium Ammon. Sulphate pur.	Very S. M.
Conchinin	55
Cochineal	S. M.
Chloral (Hydrate Schering)	50
Cetate Cadmic	About 156
" Arsenate	S. M.
" Chromate	103
" Oxalate	60
" Sulphate	S. M.
* " Nitrate	Pure Strongly Dis. Mag.
" Nitric (crys.)	" " "
" oxydat	" Mag.
" Phosphoric	dis. Mag.
" Ammon. Sulphate	" "
" Acetate	" "
" Oxide Com.	S. Mag.
Atropin Hydrochloric	about 60
" Hydrobromic	" 125
" Valerianic	Strongly Mag.
" Salicylic	" "

Med.

Barium Bromide	25
Arsenic White	30
" Sul Citrin	Mag. S. M.
" oxyd	90
" Metal	S. M.
Arsenious Acid	40
Acetic Pur Pur Glacial	S. M.
Acid Phosphoric	S. M.
" Salicylic	25
" Silicic	S. M.
" Euchlorodic	35
" Tannic	12
" Gallic	60
" Vanillin-Sacc.	15
" Lactic	90
" Hydramic	55
Lactose Lactis Pures	25
Acid Picronitric	15
" Salicylicum Amylic	102
" Rosolic	50
Stibium Arsenicus	dis. Mag.
~~" Chlorat pulverised~~	
" Metall crys.	120
Antimony oxydat	47
" Pulverized	S. M.
" Metallic	S. M.
" pentachloride	15

Antim. Thiosaurat. Sol.	40
Apiolin Ethydsaurat	40
Arsenic Chlorhydric. c. pulph.	20
Atropine Sl. Pilogo. Sulph.	95
" Sulph. Smithi.	15
Etrium "arsenic	70
" oxydat. nat. alkt.	135
" " alk. Ph. Bor. (Ethic. acid)	20
Calcium Iodate	35
" Iodic	about 45
Quinoidinum	15
Aniline (Sulph.)	30
Chrom. oxydat. Kydric	100
Antimony Tartrate	13
Cinchonidia Sulphate	10
"	12
Cyclamen chloride	12
Chaysarobin	30
Cinchonin	35
Chromium Sulfate	S. M.
Cinchonidin salicylic	10
Chromium Chromate	98
" tannic	35
Cinchonia Sulphate (Sulphate)	60
Chrysin Sulph. alkt.	about 25

Chinoidin	65
Caffein	40
Cartmium Trischlorat	23
Cerium oxalic oxydat	105
Cotracein (depur. Sulf.)	25
Chinoidin Sulfuric Sicc.	43
Fluoresceïn	23
Chinolin Tartaric	51
Ar. chloride. pur.	25
" hydrochloric	10
Chinolin Sulfuric	21
" Salicylic	S. M.
Cerium Sulfuric (oxydulat)	85
" Nitrate	38
Caesium Rubidium Chlorat	15
Aniline Sulfuric	15
Cerium oxydat (pure)	48
Analin Chrysoidin Arsenic	25
" Blaum Fluorhy	170.
Acid Phospho-Organic	20
" Phosphoric Hydro.	70
" " Glacial	135
Ammonia Sulphate	39
Acid Tranexamic	12
" Citric	60
" Pectinic	20
" Molybdic	S. M.

Acid. Meta-phosphoric	33
" Monochloracetic	40
" Gallic	50
" Picric	42
" ~~Malic~~ Malic	S.M.
" Cresotinic - edwi	20
" Parahydroxybenzoic "	55
" Oxybenzoic " para	40
" Lithium " (meta Acid)	39
" Oxybenzoic " (meta)	12
" Iodo-hydroxynat	20
" Magnesium	11
" Hippuric esp.	30
" Opanic	37
" Hydrocyanat	65
" Potassium saccharin	S.M.
" Cresotinic	110
" Cinnamic	37
Chlorotid	120
Ammon. Oxalic	15
" Oxalate	35
" Nitrate fused	17
" " cryst.	14
" phosphate-monobasic	20
" Phosphate (A.P.)	13
Acid Tannic	S.M.
" Carbolic	90

Ferri Sulphas (Monohydrate Sulph)	120
Ferrum sulfuricum pur. oxydat	40
Ferr. Succinic	60
Iron Tannate	S.M.
Ferr. Valerianic	S.M.
" Tartaric oxydat	S.M.
Iron Red oxide	V.S.M.
Ferri Sulphas Pulv. Sicc.	108
Ferr. Oxydat	V.S.M.
" Iodat	S.M.
" Phosphorat	V.S.M.
Ferri oxydul Nig	" "
Ferrum Malic	145
" Picronitric	60
" Salicylic	80
" oxydat. Hydrat	137
" Tannic	S.M.
Ferri Sulphas et Ammon	"
" Sesquichloid cryst.	120
" Phosphas U.S.P. (Ferric Phosphate)	95
Ferr. Phosphas lactic	60
" Phosphorus (oxydate)	54
" Sulpho-phenylic	S.M.
" Hypophosphoras	S.M.
" Pyrophosphoric	90
Ferri Sulphuret (Iron Sulphide)	S.M.

Blood Albumen 85 85
Ferrum Bromat S.M.
" Bromo-citric S.M.
" Arsenias 50
" Chlorat (muriatic oxydat) S.M.
Ferri-Ammon. Sulphas "
(Ammoniated Ferric
Ferro oxyanidum Lim 85
Ferri Ammon Citras (Scales) 90
Ferrum Bumic (in ch. recrystallz) 90
Ferri et Potass Tart. 125
(Tart Iron & Potass)
Chemic Iron Oxe S.M.
Ferrum Lactic (cryst crystal) S.M.
Ferro-morgan Citric 102
~~Ferrum Albuminatum~~
" Albuminat (Liquid) 125
" Acetic sacc 38
" Iodat U.S.M.
" Ammon chloride S.M.
Ferro-cyanokalium (ferrate) 55
Iron & Ammon - Potassio Pure U.S.M.
Ferr. Citras (Citrate of iron) 60
Ferrid-cyanokalium (ferrate) 105
Iron & Ammon Protosulph 70
Ferrum Hydro Reduct U.S.M.
Ferri et Ammon. Tartaras 65

Ferr. Iodat Alcohodirat U.S.M.
Iron Phosphate anhydrus 57
~~" Iodide~~
" Acetate ferric sice 42
" & Ammon Alum 140
" Phosphate 40
" Citrate & Ammonium 40
Ammon Uric 60
" Succinic cryp pur 18
Amidobenz (pulvd.) 17
Ammon Hypophosphorit 32
" Picrochromic (pure) 14
" Acetic 19
~~" Iodoform crook in~~
~~" Bromo~~ Picrametric 40
Iodide of Starch 23
Amidophenol (citrate) 28

Acid Alphanaphtoic 10
Ammon Tartarate 20
" Vanadinic 65
Sulphanilic Clustrad half finished.
Acid Acetine 14
Amidoazobenzol hydrochlorat 38

Amyl iodat.	25
Amidol oxalate	20
Guanidin carbonic. crystl.	25
Omidopropsinecaurs.	15
Ammon Phosphate	17
" Sulphate (pure)	30
" Sulphocyanide	27
" Sulphite	12
" Carbonas C.P.	17
" Citric	28
" Sulph.	35
" Chromic Nitrate	35
" Formicic	28
" Gallic (neutral)	30
" Bromid	15
" Salicylic cryst.	20
" Thiocyanate, Pure	85
" Sulphate (pure)	22
" Hydrate	20
" Phosphate	38
" Chloride	45
Cadmium Pure	30
Cadmium Carbonic	30
" Sulphate	43
Caesium Chlor	28

Oct 31st

Nitrate

" Nitrate

Iron & Ammon Perchloride.

Iron + ammon crystal || change plane strongly magnetic

when heated (dull strongly magnetic)

" Alkalinetic crystal (dull) D.M.&c

Mag. ring change class

When the solutions were poured

freely in a cylinder and suspended

in a cylinder of paraffin

was the cylinder set easily

a small rough) which measured

set powerfully) also change plane

Cobalt chloride showed same behavior

Cadmium Carbonic	42
" Sulpho-phenolic	23
Caffeine Benzoic Pure	40
Cadmium Acetic	20
" Nitric	27
Caffeine Sulphuric Pur cryst.	25
Cadmium Iodat	20
" Oxylat	27
Caffeine Valerianic Pur	45
" Arsenic	50
Cadmium Sulphuric	45
" Sulphurat	15
" Chlorat	28
" Bromat	25
Ammon. Bicarbic	20
" Arsenic cryst.	22
Natrium Arsenic Phosphor	17
Ammon. Bisulphuric	70
" Bichromate	15
" Boracic	27
" Gumme i gummi	S.M.
" Borate	25
" Arsenicos	S.M.
Carbo Animale pur humide	80
Ammonii Acetas Cryst. Pure	S.M.
Animal Charcoal	" "

1.55 ob. Pri. of alternative
2.20 " Lic. of alternative

As Prices of Tin (cast) shot & mass
" " " " shot & hammered " Bar & Mass

Malate Cadmium	S.M.
Bismuth Valerianic	32
" Citrate	22
" Sulfuric	65
" Tannic	20
Brucine Sulph	35
" Nitric	57
Butyl chloral hydrat	60
Borneol of Cinnamon ref.	60
Bismuth Lactic (unstable)	15
" Phenic "	S.M.
" Citric	30 each way
" Bromat	37 E 20 A ~~60~~
Barium Muriatic	175 or S.M.
Benzoin oxydat anhydr	25 ~~A~~ 32 E
" Carbonic	35 A 33 E
" Chlorat	27 A 32 E
" Fluorium Fluorat	42
" Sulfuric	28
Bismuth - Subgal (meta)	102. 25 A
" - Subsal (Subnit 7%)	105 E 55 A
" - " (pris)	30

Capsule Empty 15

Bismuth Nitrate basic 65 E

" Salicylate Basic 5.M

" Tannate 40 E 42 A

" Oxychloride 115

" Iodide 15

" Quinol-Iodide basic 90 E 85 A

~~Sto~~ Soda Bisulphate 40 E

Barium Hydrate Crude E 30 - 30 A

Manganese Oxide pure 70

Potassium Carbonate 65 E - 20 A

Ferri Quinine Citrate 115

Strychnine Bichloride 5-5

Nickel Chloride 75

Nickel Sulphate 28 E 42 A

" " 34 E

" " 47 E 7 A

Nov 6th 1918

Sod Bimat - Bismuth in Nitric Acid in solution of mag. citrate, cannot in 40 of added Hydrazine of Citric fmla.

Resistance varied no cause of Bismuth Nitrate in H_2SO_4 acid.

Bismuth Tannic in sol. in dil. H_2SO_4 Resistance capitals attended in ~~[illegible]~~ with direction fmaq.

Bismuth Nitric in Nitric Acid sol. - Increases but no since it may accounting to direction of mag. Appears to have 15 E in H

Bismuth Nitrate dissolved in H 8 with Acetic Acid no change observed in resis.

Nickel Sulphate in H_2O Plat. Electrodes no change.

Bismuth Tartrate Sol boiled in H. 8 + Acetic Acid Resistance 30000 ohms.

Oct 10 1873

Red Alternation 2.276 in per m.
6 Islands bells
1 are in field.
3 and in shaw circuit

Acetic Acid (Glacial) in pint tubes Rcs. (and not a mixture)

[illegible] Tartar Lit in dil H2SO4 [illegible] in no. due to [illegible] - Ent

Bismuth [illegible] NH4 HO precipitate
" Oxy[illegible] " " " "

(+) Bismuth Oxychloride in dil Nitric Acid
Rec for dest. 2.5 70 Thms. 1700 + 1000. May
[illegible] [illegible] [illegible] [illegible]
Bismuth Oxychloride in [illegible] Cit Sol

(+) Bismuth Oxychloride in dil Nitric Acid
in tubes in may field Rcs. [illegible]
with [illegible] [illegible] Thms X

Hard Rubber Sulp. S.M.
Stannous Chlorium 15
Sulphur Solium 17E 15A
P.Ferro. Ferrocyanide 45E 25A
Chromium Iodide 50
" Cyanide 40A 55E
Silver Cyanide 70E
" Chloride 42E
Cadmic Sulphide S.M.A S.M. E S.M.
Asphalt 60E
Kaolin 15A 13E Copey

Gum Guaiacum 100
" Sarsaparc 40
" Olibanum 23
" Tragacanthac S.M.
" Gelatin 35
" Galanut S.M.
" Benzoin (Vanilla) 35
" Kauri 35
" Asafoetida 95
" Amber 25
Kino 100
" Sagapenum 150
" Albumin (strained) D.M.S
eye S.M. Tak when hammered was slightly D.M.

Gum Ammonia 45
" Tamarak About 90
" Bonaire 35
" Damar 50
" Chicle S.M.
" Balata (purified) About 95
" Senegal 50
" Zanzibar fossil Amber 230 & 42
" Benzoin 50
" Mastic 30
" Euphorbium 20E 15A
Anime About 25
Bonair Aloes 10E 15
Zanzibar Copal 20E 10A
Opoponax (mitcham capsule) 50
Carbonized Aluminate of Nickel 100
(ammonia Sulphate)
Carbonate of Cadmium (nitrate) 70
Carbonized Aluminate Copper (sulphate) 25
" " Calcium (chl. ") 50
" " Cobalt (nitrate ") 20
" " Sodium (chl. ") 25
" " Tin (Bi Chl ") 35
" " Zinc (Sulphate ") 35
Carbonate Cerium 15E 15A
" Copper 25
" Mercury 45
" Zinc 40

Barium Hypophosphat anhydric techn. S.M.	
Ditain Pur	33
~~Iodin~~	
Elaterin Cryst. Merk.	35
Diphenyl.	30
Diphenylin	S.M.
Radix Trocken (not extracted)	60
Diphenylamin	55
Diaceton-aminopalate	15 C 10 A
Diacethylamin hydrochlorat.	150
~~Doch~~ Dichromat thiacen	35
Dinitrobenzol. Rohpl.	~~30~~ 20
" (Meta)	65
Daphnetin	35
Diphenin	50
Daturin pur. Cryst.	18
Diaethyl vanid	45
Dichrom azobenzol	70
Dialdin	30
Chlormet. Phenol (u. Chloroform Sol.)	43
Inulin pur.	65
Ammon Metallic	S.M.
Glycerinum Ammoniac	20
Dulcinol	40
Tuberculin Tolen	90
~~Oxyphenol extract~~	

Nitrophenol para.	35
~~Dinitrotoluol~~	
Nitrotoluol. crys. para.	35
Kali Phosphoricum.	30
Magnesia Tartaric	30
Magnes. Tartrat. pur.	13
" Silicic	23
" Oxydat	45
" Sulfo phenolic	15
" Sulphas (Sal Epsom)	15
" Sulfoxyd	125
" Sulfurit	45
Soda Carbonat C.P.	120
Ammon Nitr.	42
Magnesium Pur Metallic S.M.	
Natrum Phosphat	15
" Acet. Phosph.	28
Magnesia Hypo sulphurosa	25
Natrum Lactic	15
" Nitric	19
~~" Oxide Heavy Merck~~	
" Benzoic	18
" Borax	150
Magnesia Pur Carbonat	75
Magn. Boro-Citric.	35
Magnesia Bromide	19

Magnesia Hypo-sulphite	20
" Hypophosphite	32
" Carbon C.P. Cryst.	15
" Chloride	45
Magnesium Citricum	15
Soda Carbonate C.P. Anhydrous	15
" Hypo-sulphite	17
Glauber Salt	20
Muriatic	20
Molybdenum oxyd Pure	35
~~Morphia~~	
Morphia Acetate	85
" Sulphate Pure	60
Hydrum Hydrate Crude	85
Morphina Murias	40
Lithium Oxalic	30
" ~~Citric~~	
" Salicylic	27
" Benzoic	15
" Citric	35
" Boracic	37
" Sulfuric	20
" Bromide	20
" Carbon Pure	30
" Bi " Cryst	27
" Carbonic	25
" Phosphoric	25

Lithium Lactic	35
" Sulphuric	45
Calcium Sulpho-Carbol	27
" Lactic	25
" Lacto-Phosphoric	80
" ~~Iodide~~	
" Caustic C.P.	27
" Hypophosphite	42
" Phospho-Lactic (Solution)	55
" Propionic	15
" Hypo-chlorite C.P.	110
" Nitric Pure	15
" Oxalic	20
" Sulphuret	60 & 100 a
" Sulphas C.P.	27
" Phenylic Pure	25
" Phosphoric	30
" Phosphuret	~~135~~ 9.4
" Sulphurosum crude	
" Salicylic	60
" Saccharat	30
" Silicii	22
" Formas	55
" Formicic	33
" Fluoride	25
" Arsenicic	25
" Leontiten Saures	20

Aluminum Chl. Purus fund.		20
" Chromic		40
" Borocitrate	about	100
" Carbonic Purus		D.M.
Yohimbin		S.M.
Phenol Liquefactum		15
" Sulfuricum		20
" Iodatum	about	20
" Tannic Purus		20
" Fluoride		53
~~" Picrate~~	~~Apoj~~	
~~" Sulfonic~~		~~55~~ 55
~~Sulfonic~~		
" Lactic		15
" Formol		S.M.
" Permanganic		85
" Acetic Purus		20
" Ferrocyanat		22
" Nitric		25
Urosuccinamin		35
Tetraethyl Amon Iodat		20
Terpinhydrat		85

Menthol		40
Methylsyd Iodatus		D.M.
Mahonit		10
Narcein		25
Narcotin Purus		85
Naphtalamin		85
Naphtalin Bichromat		55
Naphtylamin hydrochlorat		15
Nucoleon (Wohlle gumm Eufortsching)		S.M.
Metanitro paratoluidin	Sol.	S.M.
Sulfo Carbamid		55
Valeralnatrium Benzolat		25
Veratrin Purus		20
Saccharin		
Succinimid methyl chloride		

(Film from Marya [illegible])

[illegible] 193 [illegible]

980 div. diam. cent.

[illegible] div. diam. " " at mag. cent.

1120 " " " " other "

1/4 div. diam. from last end 1080 div. diam. cent.

1/2 " " " " 1000 " " "

3/4 " " " " 1050 " " "

Length of overall W = 2.2 cm of line cent.

Weight .0173 grams.

[illegible] " " filled 350

[illegible] " " 350

[illegible] " " 380

[illegible] " " 360

[illegible] " " 366

[illegible] " " 361 = 0.01"

[illegible] " " 361

[illegible] " " 361

[illegible] " " 361

Cast iron Sounding

Weight to displace 0.237

Weight of tube 0.045 End 1/4

Middle { 1260 + 1360 } { 1447 ± 160 } { 160 + 1450 } { 1390 ± 150 }
{ 1150 } { 1250 } { 1120 }

End { 1220 + 1420 } Rifle { 0.792 muff
{ 1140 } { 1945 } { 1960 } { 950
{ 1922 } { 1900 } { 925
{ 1000 } { 930

Length 2.2 over glass 2.1 mm

Cast iron bar 15.3 g. to displace

End

Dist 1245 1415

Length 2.28

Weight of iron shell from Hadfield's

U.S. Agt

tube half full 0.080 gms

Shot 0.215 × 0.780 = 0.16 cu cm

0.118 gms

$\frac{.00142}{0.16} = \frac{.00}{1.16} = 0.026 \times 0.118 = 0.0039$

tube filled 0.112 gms to displace

2.52 mm dl

2.25 bore

260	1280	1480	1020
	1020		1020
270	1300	1480	1050
	1020		975
			5070
295	1260	1450	1014
	975		
260	1310	1480	
	1050		
260	1255	1510	
	975	7400	
		1480	

1014 cor 1480 tube.

Mass of tube. 60 mm

Piece of sheet

Mass 2.998 g.

" " 995

" " 1012

" " 950

0.098 g. to displace

{diam 1.44.5 cross section}

0.885 cm × 0.215 cm

2.15 long

1005
950
1012
975
1002
1004

2.5

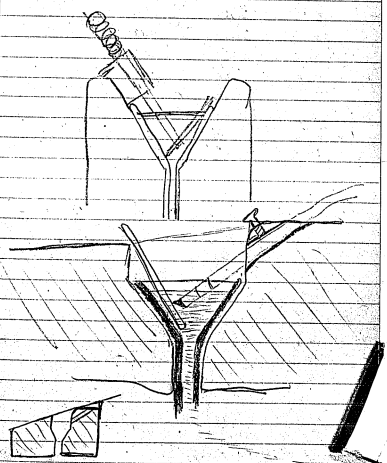
6

Tube of shaving collected under gauge

0.015 to displace

1610 inches for 2 2.2 long

119	7.1	1184	12000
116	6.78	1174	6500
113	6.20	1125	2070
109	5.90	1085	20570
106	5.57	1055	2070
103.2	5.26	1027	
100	4.92	995	
97	4.60	965	
94.5	4.30	940	
92.5	4.12	920	
90.3	3.9	898	
[illegible]	1.05	916	
83	3.25	826	
77	2.8	766	
70	2.25	697	
62	1.80	617	
55	1.4	548	
47	1.04	464	
41	0.75	408	
33	0.5	329	



~~Dia of tube~~

~~Tube~~

~~1640 ÷ 1720 cross section cock~~

Tube ~~under gas o line~~

cross-section of cock

1675 ÷ 1610

1mm = 1415 div.

Ca stick dry .018 grams.

Wt of tube filled = .060 grams.

Dia of tube 200 div microscopic

Length 1.4 cm cm.

1.46 cm. see adj.

Dia by micrometer .1438 cm.

.116 .01057 area 17.66 dynes

1671 dyne sq cm.

500 stick plate

On opening this tube, its contents tested ferrous.

Scraping from the lime sheet which have been exposed for 75 hrs tested ferrous but more nearly ferric showing presence of some oxygen

Tube from these scrapings 0.084 to dilution

dia of area average 500 div.

= 7.565 cm

area = .0020707 sq cm.

Mass = 33506

Brass soft wire (drawn)
L = 1/2 cm.
Wt = .014 grams
" to dislodge .99 grams
cross section = 8.45
current's strength 6.1 amperes

Brass soft wire 1 cm in length
Wt = .025
" to dislodge = .615 grams
dia = ~~.45~~ .850
current's strength 6.1 amperes

Brass bar ditto 1 1/2 cm long
Wt = .006 grams.
to dislodge = .777 grams
dia = .850 (1410 = 1mm)
Current 6.1 amp.

Ditto = 2 cm long
dia = .850 (1410 = 1mm)
Wt = .051 g
to dislodge = 1.179 "
Current 6.1 amp.

Ditto = 2 1/2 cm long
dia = .850 (1410 = 1mm)
Wt = .064 gr.
to dislodge = 1.412 "
Current = 6.1 amp

Ditto = 3 cm long
dia = .850 = (1410 = 1mm)
Wt = .075 g.
to dislodge = 1.5 g "
Current = 6.05 amp.

ditto 3 1/2 cm long
dia =
Wt =
to dislodge =
Cur =

6th Dec.

Telephone exp.

130 turns of steel

23 coils = 3376 w

119	7.5	1175
116	7.3	1145
1155	7.15	1141
112	6.8	1106
109	6.4	1076
106	5.95	1046
103	5.50	1017
98.5	4.95	972
96.5	4.75	953
94	4.5	928
92	4.3	908
89	4.0	879
87	3.85	859
85	3.65	839
77	2.95	760
74	2.50	740
65.2	2.10	644
54	1.50	533
49	1.25	484
44	1.06	434
38	0.85	375
0	0.28	

Dic 7th 1893 Carrington

Steel bar - cleaned with emerypaper
l = 1 cm
dia = 865 divisions (1405 = 1 mm)
wt = .024 grams
Displacing = .548 grams
Current = 6.1

Ditto
l = 1 1/2 cm
dia = 863 divisions
wt = .038 grams
Displacing = .819 grams (1405 = 1 mm)
Current = 6.1

Ditto
l = 2 cm.
dia = 865 divisions
wt = .05 grams.
Displacing = .991
Current = 6.05

Ditto
l = 2 1/2 cm
dia = 870 divs
wt = .06 gram
Displacing = 1.25 gm
Current = 6.1

Ditto
l = 3 cm
dia = 866 div.
wt = .073 gm
Displacing = 1.425 gr
Current = 6.1

Ditto
l = 3 1/2 cm
dia = 850 divs
wt = .085 gm
Displacing = 1.65
current = 6.1

(over)

Displ
l = 4 cm
dia = .843 dia
wt = .096
Displacing = 1.713 gm
current = 6.1

Dec 7th '93

Manganese Steel Wire cleaned in emery
l = 1 cm
dia = .1295 dia
wt = .0565 gm
Displacing = .0917 gm (about)

Manganese Steel Wire, emery cleaned
l = 1 cm
dia =
wt =
Displacing =
Current =

Mang. Steel Wire, emery cleaned
l = 1½ cm
dia =
wt =
Displacing =
Current =

Mang Steel Wire, emery cleaned
l = 2 cm
dia =
wt =
Displacing =
current =

Formerly weight = .039

Mang Steel Wire, emery cleaned
l = 2½ cm
dia =
wt =
Displacing =
current =

Mang Steel Wire, emery cleaned
l = 3 cm
dia = .1295 dia
wt = .161
Displacing = .040 gm
current = 6.1

Mang. Steel Mine, emery cleaned
lot 8/pcs
dia. 12.82
wt. .182
Displacing .047 gms
Curvature 6.1

Mang. Steel Mine, emery cleaned
lot 4
dia = 12.58
wt = ~~12.10~~ gm .210
Displacing = .037 gms
Curvature

Dec 8th 1893

Lute disc & cur 1.282 / 1.260
length =
wt = .088 grams
Displacing = ~~.037 gms~~ .018 grams
Curvat 6.1 aw

Length 1.65 — 1.9 over all

0.0871 0.000596 grams

3074

Dec 8th

1 Nickel Plate
.210 × .409 × 2.7
wt = 0.0992
Displacing 0.036 = 54.9 dr. 553

Mus Steel Plate
2 gon .217 × .644 × 2.7
wt = 1.98 0.1484
Displacing .045 g. 54.9 = 370

Dec. 11 1893.

Diameter of tube, 880 divisions
817 "
Varnish to 808
Thickest 887 "

Cat drain by measure for 1072 0.076 gm.
0.073 by measure

Weight to Dislodge 30.5 milligrams
Wt. of tube ~~880 mm~~ 29 milligrams
Length 2.2 in. 2.1 over core
Diam 0.05993 0.00282
29.9 dynes = 10610 dynes per cm
2.2 cm 1111

Dec. 12th

Max 1112
Min 1056

Mass L dislodge 0.070 gm

Dec 18, 1893.

Experiment on the magnetic pull of an iron wire from a laminated coil-core
Length 1/2'

Currents	Strength	Weight
1	ampere	
2	ampere	.134 grams
3	ampere	.258 grams
3 1/2	"	.465 "
4	"	
4 1/2	"	
5	"	
5 1/2	"	
6	"	
6 1/2	"	

$\frac{0.00125}{.005}$

$\frac{0.0125}{.365}$

	18400		0.00125
	20470		15.5 / 0.018
59.5 =	7.60	558	.75
53.5 =	5.85	529	5.75
50. =	5.10	495	5.0
47.5 =	4.59	470	4.49
45.5 =	4.1	450	4.0
42 =	3.5	415.5	3.4
39 =	3.05	386	2.95
36.5 =	2.6	361	2.5
33 =	2.23	326.5	2.15
28.5 =	1.7	282	1.6
27 =	1.1	227.5	1.00
	.17		

.042

0.255 cm = 0.37 " 0.04053 mm

$\frac{B}{\delta} = \frac{0.365 \times 10^3 \times 4.053 \times 10^{-2}}{.4708 \times 10^3} = 3.166 \times 10^{-4}$

15' 8"

= 31,660 1788 5.44 %

5.38 %

103	7.03	7.15	1020
102	6.95	7.0	1010
99	6.55	6.7	980
96.5	6.15	6.3	956
94	5.8	5.95	931
88	4.9	5.05	871
86	4.6	4.75	852
80.5	4.0	4.15	797
74.5	3.35	3.5	738
68	2.75	2.9	673
61	2.2	2.35	604
57	1.85	2.0	565
51	1.45	1.6	505
43.2	0.95	1.00	428
38	0.7	0.85	376
33	0.48	0.63	327
27	0.28	0.43	267
23	0.15	0.30	228
0	-0.15		

1st Test

11	6"	11½"	[illegible] sodium
	5½	10⅜"	
	½	½	1"
	4"	8⅞"	
	3½	4¾	
	½	1.5"	= ½"

with a blued sodium lamp

	3¼	4½	7¾
	8½	8¾	5¼
Quo	13¾	¾	2½
	5"	11"	16
	3½	8¾	12¼
	1½	2¼	3¾

163 30th Dec. 92

coated	3¾	8 ¾	12 ¾
10 am			
stripped	5	11½	16½

Test of current strength of lamps in series. (105 Volts)

current with	one lamp	—	.027
"	2 lamps	—	.017
"	3 "	—	.011
"	4 "	—	.0007
"	5 "	—	.0004
"	6 "	—	.00045
"	7 "	—	.0004
"	8 "	—	.00035

Memoranda of Books taken.

1. Dynamo electric machinery.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.
17.
18.
19.
20.
21.
22.
23.

$(a+ib)^2 = a^2 - b^2 + 2iab$

$1 + i^2 = 1 - 1 + 2i$

$= 2i$

$r(\cos\theta + i\sin\theta) = re^{i\theta}$

$r = e^{i}$

$e^{i\theta} \cdot e^{i\theta} = e^{(i+i)\theta}$

Oct 3 1st 1943

Trials of [illegible] in solution

Dyer Crystals (D.C) Trial Cond.

[illegible]

$$\frac{24.6331}{58} \times \frac{2.9}{3.1416} = 0.259$$

$$\frac{24.6331}{65.2636} = 0.3953$$

$$\int_0^{\pi} \sin^2 \phi = \frac{\pi}{2}$$

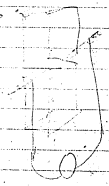
0.4

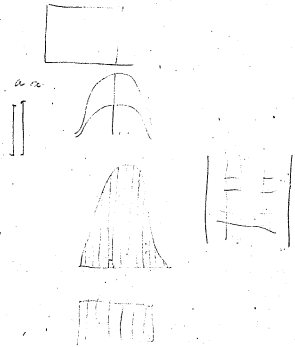
average ord. = 0.41 × 2 = 0.82.

20
2 | 6
7.4

2.2.5
20.5
2.

200
20
80
3.7
2.06
1.00
2.60





$\frac{nh}{n}$ = h

[ITEM FOUND IN BOOK]

Dear Mr Kennelly Jan 6/93.

In comparing this meter with the one belonging to the N.Y. office, please call this "A" and the other one "B."

Sincerely

E.W. Hammer.

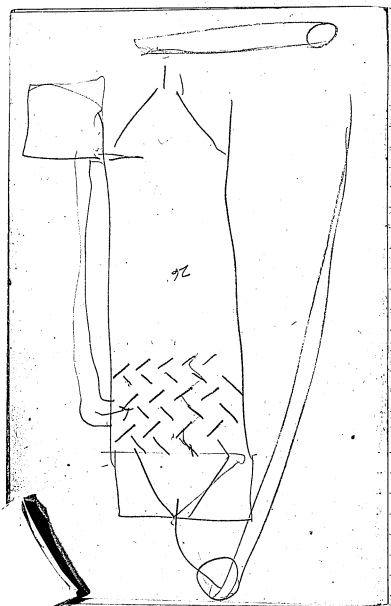
DIVISION OF INSPECTION

EXTERNAL CORRESPONDENCE

EDISON GENERAL ELECTRIC COMPANY

Notebook, N-93-08-01

This notebook covers the period August-November 1893. It was used by Joseph W. Harris for notes, tables, and calculations regarding ore milling, ore assays and other chemical analyses, and experiments on lubricants, phonograph cylinders, and the manufacture of parchment paper. Among the ore-related entries are a series of bricking experiments, nos. 1-110, together with cost calculations for each compound; and experiments in the production of cement from tailings of the concentrate at Edison's plant in Ogden. Among the phonograph-related material are two pages of notes on the examination of a wax cylinder made by the American Graphophone Co.; and a series of experiments, nos. 1-100, on a base for cylinders. The front cover is marked "Chemical Experiments by J. W. Harris." The pages are unnumbered. Approximately 190 pages have been used.



Aug 1st 89

Experiments on Resin

Ascertaining the % residue of resin, after heating to 600° F.

Weight of Resin + Dish	45.650 lbs
" " Dish	34.850 "
" " Resin	10.800 "

Residue + Dish	38.915
Dish	34.850
Residue	4.065

= 37.639 % Residue

1

Gm 4 - SO_4, $CaCO_3$, Ferrous Sulphate

#1 - 5 grams Rocin, 1 gram Ferrous Oxide
2 - 5 " " 1 " Carbonate Iron
3 - 5 " " 1 " Ferric Sulphate
4 - 5 " " 1 " Fuel Brimstone
5 - 5 " " 1 " Al_2O_3

#1 & #2 which in the case failed up the Gas being Wanted Decomposed,

#4 seemed satisfactory

#3 & 5 did not appear to present any chemical action, but lost WG the residue from metal d [illegible]

#1 - 91.175 - 87.25 = 4.5 - 1 = 3.5 = 70%
#2 87.00 82.00 = 5.0 - 1 = 4.0 = 80%
3 82.00 79.00 = 3.0 - 1 = 2.0 = 40%
4 89.00 85.5 = 3.5 - 1 = 2.5 = 50%
5 88 84.75 = 3.25 - 1 = 2.25 = 45%

The weight of residue from 5 grams Rocin is 2.26 grams, therefore the final residue of an experiment must weigh more than 3.25 grams

Wt	Grams	Contents	Total	Residue + crucible	Residue	% Residue
#6 87.25	5	1 mg. CO_3	93.25	91.5	3.25	65
#7 82.00	5	1 Mg O	89.00	86	3	60
#8 79.00	5	1 Mg NO_3	89.00	82.75	2.75	55
#9 85.5	5	1 Mg. acetate	91.5	87.5	3	60
#10 84.75	50 grams of Rocin mixture, 99 Sy 1% Lime		134.75	[illegible]		
#11 230	9 Rocin Lime	491 Lime	730	722.75		22.22
#12 86	5 R	26 Clay	111	108.2		40
13 86	5 Lime	50 Clay	141	137.5	1.5	30
14 82.5	5 "	20 $FeCl_3$	107.5	101		—
15 87	5 "	5 Clay	97	89%	X	—
16 83	5 "	3 Ca_2SO_4	91	89.2	2	40
17 85	5 "	5 Sulphate Lime	95	92.2	2	40
18 85.55	5 "	5 Sulphate Ferrous	95.5	92.5	2	40
19 86.5	5 "	5 Sulphate Lime	94.5	91.5	2	40
20 85.75	5 "	5 Ca_2CO_3	95.75	93.25	2.5	50
21 83	5 "	4 Silicate Soda	92	Failed		
22 83.25	5 -	2 Sugar	90.25	86.5	1.75	25
23 82.5	5 "	3 Peat	90.5	87.5	2	40
24 80.25	5 "	3 Ferrous	88.25	83.25	0	—
25 84	5 "	3 CaO	92	89	2	40
26 84.5	10 Lime Plain					
27 84.5	10 Lime					
28 38.75	10 Lime		48.75	41	2.25	22.5
29 28	5 Sulph. K		39.75	30	2	1.7
30						
31						

No.	Wt.	Time	Compound	Wt.	Residue	Residue	Residue	%
30	80.5	5 & R	5 Fe Cl	90.5	85.75	1.25	5	64
31	83.25	5.5 "	2 H_2SO_4	90.75	85.25	X	—	65
32	86.5	5 "	2 HNO_3	88.25	2.75	55		
33	82	5 "	2 HCl	83.5	1.5	30		
34	85.5	5 "	1 H_2SO_4	88.25	2	40		
35	86	5 "	1 H_2SO_4	87.75	X	—		
36	85.75	5 "	1 HNO_3	87.75	X	—		
37	82.75	5 "	5 Ca OCl	91.25	3	60		
38	84	5 "	5 H_2O_2	86	2	40		
39	81	5 "	5 HCl	80	—	—		
40	81.5	5 "	5 Formalin	82		10		
41	84.5	5 "	5 Glycerine	88	—			
42	77	5 "	5 Iodine	79	2	40		
43	86.5	5 "	5 NH_4OH	88.5	3	60		
44	83	5 "	5 $MnSO_4$	89.5	1.5	30		
45	83	5 "	5 Yellow	91.5	1.5	30		
46	84	5	5 Potash	90.5	1.5	30		
47	82	5	5 NH_4Cl	89.5	1.5	30		
48	83	5	5 $Mn(NO_3)_2$	87.5	2	40		
49	82	5	5 Potassium	88.5	1.5	30		
50	81.5	5 "	5 $CaCl_2$	89.5	3	60		
51	84.5	5 "	5 Magnesium Chloride	92	2.5	50		
52	82.5	5 "	5 $MgSO_4$	88.5	1	20		
53	79.5	5 "	5 $MgCl_2$	88.5	4	80		

No.	Weight of Brick	Brick	Compound	Wt.	Residue	Residue	Residue	%
54	84	5 F+R	5 $MgNO_3$		90.5	15	30	
55	82.5	5 F+R	5 Mg Sulfate		90	7.5	50	
56	Brick	made with the following preparation						
	Che	2240, F+R 22.5, $MgCl_2$ 2						
		not successful						
57	Che	2240	F+R 22.5 $Fe CO_3$, 15.					
58	Che	2240	F-10.8 R-8, $MgCO_3$ 3 - Coal 120					
			failure					
59	Che	2240	F-12, - H_2SO_4 1, H_2O_2 10 Coal 5.4					
			not good					
60	Che	2240	F 12, - H_2SO_4 1, H_2O_2 10 Coal 1.5					
			not brick					
61	Che	2240	F 10, R-4, H_2SO_4 1, H_2O_2 10,					
			not good					
62	Che	2240	F-15 H_2SO_4 2 - H_2O_2 0					
		F + H_2SO_4 + H_2O boiled and then added						
		to the ore, seems to brick fairly well.						
		Bricks not strong enough						
63	Che	2240	F-10, R-10, H_2SO_4 2, H_2O_2 0.					
		F R H_2SO_4 + H_2O all boiled together first						
		then added to the ore						
		not good						

64 Ore 2240, 8-10 R 10 H, Sly 1.
no good

65 Ore 2240, 8-5 - H. Sly-4.

66 Ore 2240 8-10 S-5, —
no good

67 - Ore 2240, 8-10, coal tar patch, 5
no gold -

68 - Ore 2240 - Sluge 10, Ore hot, 23.07
no good

69 Ore 2240 Sluge 15, Ore hot
Brick well
no cyb 185.5 - 184.5 8 cts

70, Ore 2240 Sluge 15, Lima 7.5 - Ore cold
Worst lick

71 Ore 2240 Sluge 15, Lima 5, Ore cold.
No good

72 Ore 2240 Sluge 20, Lima 3, no cold
20.7, Brick well, O.K. and 5.3 cts

73 - Ore 2240, Sluge 14, Lima 2,
Pan 1, Ore cold.
Worst mix, some little balls -

74 Ore 2240 Sluge 14, Lima 3, Pan 1
No good

75 Ore 2240, Sluge 17, Lima 3, Pan 1,
No good -

#72 is the best yet obtained

∴ Chrzzyo, Pur. - 30 P. 15

76 [illegible] 3.

77 [illegible] 15

[illegible]

No good

[illegible] mixed [illegible]

[illegible] H_2SO_4

[illegible] it solidifies, which

[illegible] the [illegible]

[illegible] change [illegible] from

the mixture, therefore it is

disadvantageous to have reagents

ground up so fine to be kept

any great length of time.

78 Chrzzyo, Pur. Rg. - 18

H_2SO_4 - 4.5

Not mixes

79 - Chrzzyo, Pur. Rg. - 12 -

mixed fast, then 4.5 H_2SO_4

without H_2SO_4 mixes well

[illegible] with H_2SO_4 acid

mixes well, dries very well,

Weight of brick before heating 167.25

" " after " 166.00

Lost - 1.25

∴ = 25% residue

The brick contained 1.66 grams

mixture by calculation,

Cost 12.75 cts.

80 Chrzzyo, Pur. Rg. 18 - H_2SO_4 2,

Chrz + Pur. mixed fast + H_2SO_4

added

No good, aint brick.

81 - Chrzzyo from 20 - H_2SO_4 4.5

from + H_2SO_4 combined fast

No good -

82 Ore 2240 [illegible] = 20 = 16.5 [illegible]
Ore fain mixed [illegible]
H_2SO_4 added [illegible]
No good –

83 Ore 2240 fain 1 – H_2SO_4, 2.5,
Lime, 2.5 –
H_2SO_4 + Lime sentured first,
+ rosin added – cut
no good –

84 Ore 2240, Rosin 9, Lime 15,
H_2SO_4 4.5
no good –

85 Ore 2240, Rosin + Lime reg. 9 –
HNO_3, 2 lbs.
no good.

86 Ore 2240 Rosin + Lime reg, 20 lbs
Sulphur 2 lbs.
no good

87 – Ore 2240 Rosin + Lime, 3.0
Sulphur 2 lbs.
O.K., bricks small
Weight, before heat., 177.75
" after " 177.25
= 80 % residue, cost 15 cts.

88 – Ore 2240, Rosin + Lime 2.5 –
Sulphur, 1 lb –
O.K.
Weight before heating 179.25
" after " 178.5
= 64.3 % residue
cost 12 cts.
brick is not as good as 87.

89 Ore 2240, Rosin 12 – Lime 10.
Sulphur 1.5
want brick.

90 Ore 2240 Rosin 12 – Lime 8
Sulphur 1.5
no good, want brick

91 Rosin 15 - Lima 10 [illegible] 1.5
Clear 22 [illegible]
[illegible] well [illegible]
Black well

92 Rosin 17, Lima 10,
Sulphur [illegible] C.K.
Original [illegible] weight 170.5
" " " cts. " 169.5
= 64.9% residue. 1.0
cost 13.9 cts

[illegible] Rosin 15, Lima 12
Sulphur 2 cts.
Fair
Weight 170.5
" 169.5
1.0 [illegible]
Residue 57.6%
Cost 15.8 cts

94 - Clear 2240, Rosin 20 Lima 12 - Sulphur 2
Fair Cost 16.7 cts
Wt 146.15
" aft. 145.
Residue 48%

95 2240 Ore
Rosin, 20, Lima 13, Sulphur
1.75 Good
Weight, 1# 1.950 Cost 16.8 cts
140.730
Tot 1.200 = 44.9% Residue

96 - Rosin 20 2240 ore Lima 13, Hematite 10
good.
Weight 136.850 cost 17 cts
135.760 = 55.8%
1.15

97 - 2240 ore Rosin 20, Lima 13, Na2CO3 3
good. Cost
Weight 153.300 16.1 cts
152
1.3
Residue 44.8%

98 Rosin 20, Lima 13, Clay, 2240
good - Cost
Weight - 144.900 15.1 cts
143.300
1.6 = 23.8% Residue

99 Cl. 22.40 Resin 20, Lime 13, Alk 2.5
1.2 - good.
Cl. 136.2 Cost 15.1 cts
" 135.05
1.15 Residue 43.4%
old 10, al 9.2 cts Cl.

100 Cl. 22.40, Resin 20, Lime 13, Sulphur 2.5
Good - 17.6 cts
Cl. 134.45
1 : 50%

101 Cl. 22.40, Resin 20, Lime 13
$Ca\,CO_3$ 2 Good
Cl. 128.2 Cost 15.9 cts
27.2 ($Ca\,CO_3$ allowed for)
Cl. cost 0.40 cts per lb. 1 = 49.9%

102 Cl. 22.40, Resin 20, Lime 13, Soda 3
fair
195.100 Cost 16.9 cts
143.850
1.25 = 40% residue

103 Cl. 22.40, Resin 20, Lime 15
Chloride of lime 10,
no good -

104 Cl. 22.40 Resin 20 Lime 13
Ferrous Sulphate 2.0
no good

105 Cl. 22.40, Resin 20, Lime 15
HNO_3 10,
137.2
136.1 Cost 16.9 cts
1.1 45% Residue

106 Cl. 22.40, Resin 20, Lime 13
HNO_3

Weight 131.95 Cost 25.1 cts
130.30
1.55 Residue 26%

107 - Cl. 22.40 Resin 20, Lime 13, HNO_3
1,
148.8
147.5 Cost 18.6 cts
1.3 Residue 40%

108 [illegible] 450. [illegible] 20. H. 50.

[illegible]

107 [illegible] 10

for 137.00

135.80 [illegible] 20. pots

1.2 [illegible] 31 %

110 [illegible]

[illegible]

[illegible] 137.7

Mercurio Nitrate of pure first of
[illegible] Clyde

Contains 54.36% Chloric = 39.35 5/6
fe, and 45.64% tailed

Assay of tailed for P_2O_5
digested 5 grams in HCl + a small
H_2SO_4 to oxidise any PH_3 which might
be formed.

Filter paper weighs 0.542 grams
1.1925
.6505

Filter paper weighs 0.527
2.866
2.239

Filter paper weighs 0.5142
0.6535
0.1393
Total yellow ppt = 3.0288 grams
= 0.04937 grams P = 2.27% P_2O_5

Cruda

Cruda

0.5585

0.5585

Feb. 41, 9.7.

0.822 "

0.917 %
0.5585
0.5245

0.5585
0.822
0.237

New find crude 67 % Phos

Oct. 18 38.7 - 48.4 - .3 = 9.4 = 96.3%
" 19 50.3 60.0 - 1 = 9.6 ac = 77.11%
" 20 60.3 71.4 - 1 = 11.0 88.35
" 21 55.9 67.1 - 1 11.1 89.15
" 22 63.6 74.37 = 10.6 ac = 85.14
" 23 53.5 - 67.8 - 14 - 3 - 3 = 14.0 ac = 82.00
" 24 32.9 - 47.5 - 0.3 = 14.3 = 83.14%
" 25 - 29.8 - 44.9 - 15.1 - 0.3 = 14.8 = 86.0422 = 86.04%
" 26 - 32.5 - 47.8 - 15.3 - 0.3 = 15.0 ac = 87.21
" 27 58.9 - 75.8 - 15.9 - 0.3 = 15.6 ac = 90.678 = 90.68%
28 - 81.4

24.8 - 39.8 = 15 ac - 14.7 =

Nov 16 - 56.0 - 71.8 = 15.8 - 0.3 = 15.5 = 90.12
Nov. 20 54.8 - 70.4 = 15.6 - 0.3 = 15.3 = 88.95

Experiments on applying for [illegible] Sept 12th 1893

#1 100 grams 14 mesh tails of [illegible]
5 gm Stage Oil.
2" x 1 1/2"
length 2 15/64 x 1 1/2

#2 100 grams 14 mesh tails
5 " Wood tar
3 X 1 1/2

Mixed hard to mix and not of a smooth plaster
2 15/16 x 1.5

#3 100 grams 14 mesh
10 " Wood tar
2 15/16 x 1 1/2
very plaster — stood dry, good
2 15/16 x 1.5

4

100 grams 14 mesh
7.5 " Wood tar
3 x 1 1/5 — fair
— 3/32 long 1 1/32 wide

5 Stage + Pinus 30 - 10 - 7 grams
100 grams 14 mesh tail
2 15/16 x 1 1/2 hell — good
2 15/16 x 1.5

6 — 100 grams 14 mesh
10 grams of Point Pinus Oil, rosy prepin
3 x 1 1/2 good
2 15/16 — 1 15/32

7 100 grams 14 mesh
10 " Pinus + Rosin mixture, Rosy
3 x 1 1/5 good
2 15/16 x 1 5/32

8 100 grams 14 mesh
10 " Rosy Oil + Rosin, Rosy
3 x 1 1/2 fair
2 15/16 x 1 1/2

9 – 100 grams 30 mesh tails
10 " Wood Tar –
3 X 1½
3 X 1½

10 100 grams 30 mesh tails
10 " Reg Sludge mixture –
3 X 1½ – fair
2 13/16 X 1½

11 100 grams 30 mesh –
10 " Lime & Rosin Reg –
V 3 X 1½ good –
2 31/32 X 1 1/5

12 – 100 grams 30 mesh –
10 " Lime & Rosin Reg
V 2 7/8 X 1½ good
2 7/8 X 1 5/4

13 – 100 grams 70 mesh –
10 " Lime & Rosin reg –
3 X 1½ very good –
3 X 1½

14 – 100 grams 70 mesh –
10 " Sludge mixture –
3 X 1½ very good –
2 13/16 X 1 15/32

15 – 100 grams 70 mesh
10 " Wood Tar
2 7/8 X 1½ very good –
2 55/64 1½

16 150 grams of fine Concentrates
10 " Lime & Rosin
3 X 1½ very good –

17 150 grams fine concentrates
10 " Wood Tar
3 X 1½ very good –

18 — 150

10

Data of cement experiments

No.	Length before heating	Length after heating	Breadth before heating	Breadth after heating	Contraction %	Remarks
1	3"	2 61/64	1.5"	1.5		
2	3"	2 15/16	1.5	1.5		
3	2 15/16"	2 13/16	1.5	1.5		
4	3"	2 29/32	1.5	1 15/32		
5	2 15/16"	2 15/16	1.5	1.5		fair
6	3	2 15/16	1.5	1 15/32		
7	3	2 13/16	1.5	1 15/32		
8	3	2 15/16	1.5	1.5		
9	3	3	1.5	1.5		Brittle
10	3	2 15/16	1.5	1 7/16		
11	3	2 31/32	1.5	1.5		Very fine
12	2 7/8	2 7/8	1.5	1.5		Very fine
13	3	3	1.5	1.5		Brittle
14	3	2 15/16	1.5	1 15/32		
15	2 7/8	2 55/64	1.5	1.5		
16	3		1.5			
17	3		1.5			
18	3		1.5			

A mixture of 20 lbs of reg. Pimiaol and Rosin (15 + 30) to 1 ton of 50 mesh concentrates was bricked and sample sent to Wm. C. Frick of Mahoning Rolling Mills Co. Hamilton, Pa. to be tried as a lining for puddling furnaces.

Made of [illegible]
[illegible] (1-2)
[illegible]
Tests by Mr. Edison were run in the
[illegible] & the highest leakage noted
[illegible] per square inch, the fee of
50 mesh tailings
no good, can not begin to mix it.

2. 45 lbs [illegible] resin mixture, 1 ton of 50
mesh tailings.
no good. cannot mix it.

3. 50 lbs resin mixture, 1 ton 50 mesh
tailings
no good, makes a very dry powder.

4. 60 lbs Rosin Mixture 1 ton 50 mesh tailings
makes a dry powder.

5
[illegible] lbs resin mixture to 1 ton 50 mesh tailings
mixes a little hard, but bricks well
might do where pressure can be
applied.
broke at 7 feet

6
100 lbs resin mixture, 1 ton 50 mesh tailings
mixes little hard, bricks well
not plastic, must use pressure to
use it.
broke at 3 feet

7.
150 lbs resin mixture 1 ton 50 mesh tailings
mixes well, bricks well, but is not
sufficiently plastic to use without
pressure.
did not break at 5 feet, not at 10 feet, broke at
25 feet probably good at 15 feet
8. 175 lbs resin mixture, 1 ton 50 mesh tailings
mixes well, is plastic enough for
use without pressure - stiffens & moulds
when hammered in.
did not break at 4 feet, broke at 10 feet

2.1 [illegible] 50 mesh [illegible]
[illegible] will [illegible]

10 - 28 lbs [illegible] 50 mesh concrete
[illegible] day, no good.

34.5 lbs [illegible] 1 ton 50 mesh
[illegible] mixes well, bricks
[illegible] smooth, plastic, to use
without trouble
chipped at 4 feet, broke at 8 feet,

12 - 41.5 lbs [illegible] 1 ton 5 mesh concrete
mixes fairly well and mix better
if warmed. bricks well, not
too plastic enough -
broke all to pieces at 10 feet, soft
13 - 55.5 lbs [illegible] 1 ton 50 mesh concrete
mixes well, bricks well, but
not plastic enough
broke at 4 feet, duplicate did not break at
2 feet, broke at 3 feet,

14 - 70 lbs [illegible] 1 ton 50 mesh concrete
mixes well, bricks well, is
plastic and should be for all
purposes.
chipped at 4 feet, chipped at 12 feet, broke
at 20 feet - pretty tough
15 - 105 lbs [illegible] 1 ton 50 mesh concrete
mixes well, bricks well but is
so very plastic that the bricks stick
to the mould.

16 30 lbs [illegible] 1 ton dust from lime
mach -
no good today.

17 - 40 lbs [illegible] 1 ton dust from lime
no good, to day.

18 50 lbs [illegible] 1 ton dust from lime
mixes well, bricks well, but is not
plastic. can be used only with press

19 - 60 lbs [illegible] 1 ton dust from lime
[illegible]
mixes well, bricks well, but not plastic enough -
did not break at 4 feet, broke at 10 feet

20 - 50 lbs rosin mortar, 1 ton dust from lime
mixes well, bricks well, but not plastic enough
chipped at 3 feet, broke at 5 feet

21 - 100 lbs rosin mortar, 1 ton dust from lime
mixes well, bricks well, + is plastic, but mixed better if mixed so -
chipped at 4 feet, duplicate broke at 8 feet

22 - 125 lbs rosin mortar, 1 ton dust from lime
mixes well, bricks well and is plastic enough (did not break at 4 feet, 10 feet, nor at 30 feet, chipped on second trial at 30 feet, very hard
23 - 150 lbs rosin mortar, 1 ton dust from lime
mixes well, bricks well, + is so plastic that it sticks to mould

24 - 30 lbs rosin mortar, 1 ton dust from lime dust (separated by blower)
does not mix as good -

25 - 40 lbs rosin mortar, 1 ton dust from lime dust (separated by blower)
mixes well, bricks well, but is not very good, is a little dry -
broke at 2 feet, dup. at 3 feet,

26 50 lbs rosin mortar, 1 ton dust from lime dust (separated by blower)
mixes well, bricks well, but not plastic
all 6 pieces at 3 feet, dup. same at 2 feet

27 - 60 lbs rosin mortar, 1 ton dust from lime dust (separated by blower)
mixes well, bricks well, but is not plastic -
broke at 4 feet, duplicate broke at 3 feet,

28 - 80 lbs rosin mortar, 1 ton dust from lime dust (separated by blower)
mixes well, bricks well, but not quite plastic enough -

Portland Cement 33 lbs, duplicate 33 lbs, same mark

29 - 100 lbs resin mixture, 1 ton of dust
Che (indurated [illegible])
mixes well, brings well in blocks,
and would do [illegible] well
chipped at 10 feet, broke at 25 feet, dropped 20 feet, blank
30 - 50 lbs resin mixture, 1 ton dust from
Che (indurated [illegible])
mixes well, brings well, [illegible]
[illegible] should do -
did not break at 5 feet, 15 feet, 20 feet at 10 feet, chipped
at 15 feet, dropped [illegible] 30 feet, very dense
31 - 100 lbs resin mixture, 1 ton dust from
Che (indurated [illegible])
mixes well, brings well, but has
a tendency to stick to mould,
is very plastic & should be better
for ordinary use than # 30
chipped at 4 feet, did not break further at 20
feet, duplicate broke at 10 feet, hard & dense

32 - 30 lbs resin mixture, 1 ton crude
Che - 14 mesh
no good, when mixed, is to dry -

33 - 40 lbs resin mixture, 1 ton crude Che
no good, to dry -

34 - 50 lbs resin mixture, 1 ton crude
Che, 14 mesh
no good, to dry when mixed

35 - 60 lbs resin mixture, 1 ton crude Che
no good to dry -

36 - 80 lbs resin mixture, 1 ton crude
ore - 14 mesh
mixes well, brings well, but
is a little dry.
broke at 6 feet, not so very hard.

37 - 100 lbs resin mixture, 1 ton crude Che
mixes well, brings well but
the particles are so large that
even though there is considerable
plasticity they do not adhere
crumbled at 4 feet, broke at 10 feet, hard
38 - 150 lbs resin mixture, 1 ton crude
ore - 14 mesh
mixes well - brings well is
very plastic but does not adhere
broke at 10 feet, did not break at 4 feet
can break with fingers, chip broke at 10 feet, but not at
5 feet - hard

Bricks were made from 50 mesh [illegible]
[illegible] & Penna Black,

40 lbs rosin molten (35 Rosin, 10 Penna fabricon) 1 ton tailings 30 mesh
not good, [illegible] too stiff
to crush

40 lbs rosin molten (30 rosin, 15 Penna)
1 ton tails
not good

40 lbs rosin molten, (30-15) 1 ton tails
no good

120 lbs rosin molten, (30-15) 1 ton tails,
mixes well, looks well, cannot say well use less rosin molten,
made 5 briq
4 of these briq were placed each in a carbon crucible box and surrounded with charcoal and heated in large furnace in room 3
The first taken out at an orange heat, second at a yellow heat, 3rd at a dull white heat 4th at a bright white heat -

Of these experiments which were found after 36 hours standing, the 1st + 2nd were no good being too brittle, the 3rd was very good, hard, + not contracted very much. The 4th had all contracted out of shape, was fused, and full of holes inside.
The 3rd was also very porous. Mr Edison thinks that if they had not been surrounded with charcoal, they would have done better - The experiment repeated without charcoal all other conditions remaining the same -

[illegible] of Burn's sample #5
of Sludge and [illegible] and
[illegible] was [illegible]
[illegible] of [illegible] mixed [illegible]
[illegible] 50 lbs [illegible]
[illegible] [illegible] [illegible] study
qualities, and would not burn,

Tried a mixture of 25 lbs sludge
and 15 pounds #5 sample, in the
fireback of range for improved
[illegible] [illegible] [illegible] when
[illegible] [illegible] [illegible] [illegible]

Experiments on Mixed Oleates

#1

Magnesium Oleate

15 grams Oleic Acid

3.5 " $MgCO_3$ Anhydrous.

added 5 grams Oleic acid.

is quite fluid at 300°, since about bit increased.

Cooled some from Petroleum & then dissolved in methylene, but as soon as Petroleum evaporated solidified at 350°?

Time Petroleum the same.

#2 Oleate of Calcium.

1 Part $CaCO_3$

5 " $C_{18}H_{34}O_2$

seemed to combine with $CaCO_3$

~~added~~ poured off the Oleic Acid, and added slaked lime, in the proportion of 9 Oleic acid, 1 of Anhydrous lime.

is thick at about 150°?

not good.

Chlor of Ba. 3

1 part $BaCl_2(H_2O)$
3 " $C_6H_8O_6$
5 grams Barium Hydrate
1.5 " Oleic Acid
added afterwards, 5 grams more Barium Hydrate

forms a brown gummy mass,
melted in "soap" at 350°C,
but brittle when cold

3-1
Acid 1 gram Perma Petrolatum to 5 grams
of above mixture - is brittle when cold -
added 1 gram more of Perma Petrolatum,
no brittle when cold.

3-2
5 grams above, 3 grams Yellow -
brittle when cold

4
Chlorate of Aluminum

2 parts Oleic Acid
1 " Aluminum Chloride

Combines without any difficulty, Hcl
being given off, at 350°C is quite
soapy and when cold is quite
a little brittle.
20 grams Oleic acid + 10 grams Al_2Cl_6
new mixt. It now weighs 21 grams -
To this added 3 grams Perma Petrolatum
added about 10 grams extra
To brittle.

5

Oleate of Alu

3.6 grms - Oleic Acid
6 " Al_2O_3
5 " Perma Petroleum

not good will not combine

#6 -

Barium Oleate,
2.5.6 Oleic Acid
10. Barium Carbonate -
after all combined,
5 Perma Petroleum -

Will not combine with the carbonate

~~#5~~ Use #2
7 6.4 Oleic Acid
5 Barium Hydrate,
after combination,
add 3 grams Perma Petrolu

at 3 90°F, is quite stringy,
but is little when added -

#7

Aluminum Oleate.

20 Oleic Acid
10 Al_2Cl_6 –
after combination, had gone down to 25 grams added 5 grams Pennsylvania Oil – at 350°F is quite ropy, removed from fire so as not to evaporate all Pennsylvania Oil –
still smells of HCl –

#8

Aluminum Oleate –

10 Oleic Acid
5 Al_2Cl_6 –
after combination, weight had reduced to 12.25 grams, added
2.5 grams Lima Petrolin
at 350°F is quite ropy
after cooling, was to brittle, added again
2.5 grams Lima Petrolin –
after cooling is still brittle, added again
2.5 grams Lima Petrolin –
after cooling to brittle added
2.5 grams Pennsylvania Petrolin,

9

Oleate of Iron

15 grams Oleic Acid
5 " Ferrous Carbonate.
does not combine.

10

Common Soap — and Lime Pet.
and Perma Pet.
is a little stiff at 40°C

10-1

10 grams Common Soap
10 " Perma Pet; added
10 " " "

#11

5 grams Common soap -
5 " Lima Petrolum
[illegible] fluid at 410°F,
stiff at 350°F
[illegible] when cold.

#12

5 grams Common soap -
2.5 " Lima Petrolum
fluid at [illegible]
stiff at 350°F
[illegible] when cold -

#13

5 grams Common soap
10 " Lima Petrolum
stiff at 340°F.
fluid at 410°F
slightly brittle when cold

#14

5 grams Common Soap
12.5 " Lima Petrolum -
fluid at 360°F -

#15

5 grams Common Soap
15 " Lima Petrolum

fluid at 350°F

#16

5 grams Common Soap -
5 " Perma Petrolum -

solid at 350°F
fluid at 400°F

#17

5 grams Common Soap
7.5 " Perma Petroleum

fluid at 400°F

#18

5 grams Common Soap
10 " Perma Petroleum

fluid at 370°F

#19

5 grams Common Soap -
12.5 " Perma Petroleum

fluid at 400 -
stiff at 340°F

#20

5 grams Common Soap -
15 " Perma Petroleum -

solid at 335°F -
fluid at 370°F
duplicate with other quantity of material, solid at 360°F.

#21

5 grams Common soap
25 " Perma Petroleum -

#22 - Duplicate of #20 with 20-60 after combustion it weighed 62 grams, loss of 22.5%.

A sample of H.20 weighing 50 grams was heated to about 100°C for 9 hours, & one hour the temp was up to 88°C. At the end of the heating it weighed about 30 grams, was still a lubricating oil, is dark when cold.

Experiments to determine the solubility of the sample of Sludge acid in Lima petroleum, and Shumbleduck acid sample H 5.

Sample #1.

Weighed 20 grams into a dish, and added enough lima petroleum to make it about the proper consistency for blacking purposes. It then weighed 22.5 grams. Which was boiling. It was not heated, simply stirred with a stick.

On adding a large quantity of lima petroleum to it, it completely dissolved, forming a sticky fluid, which still seems dissolved in addition of more lima.

Is soluble in lima

#2 –

[illegible] very still [illegible] residue
[illegible] of Sl[illegible]
[illegible]
added 5 grams of Lime
[illegible]
[illegible] After [illegible] time,
[illegible]
All good

#3 [illegible]
[illegible] 50 [illegible]
[illegible] 90 grams used
added 5 grams Lime
[illegible] time on heating
or cooling it became very brittle
due to contamination.

– NS good

#4

A oily carbon residue, smells strongly of SO_2.

10 grams used.
5 " Fine.

Note: It is milky it uses well it burns, but it separates out again on cooling.

Also good

#5 is a fluid -

#6 is a fluid - but it contains a substance which separates out in the old. On heating this substance dissolves and its odor is a fruity oil like. seems to be quite separate from the rest of the mass. Peppermint

It contains considerable free acid but does not smell of SO_2

H 7

is a dry acid residue, and
[illegible]

10 grams used
5 grams Lime.

It contains [illegible] %
[illegible] a considerable
[illegible] H_2SO_4
[illegible]

All good

H 8.

is a dry acid residue and
[illegible] H_2SO_4

10 grams used
5 " Lime.

Mixed with Lime which has
but separates when cold.

All good.

9

[illegible] mean time [illegible]
[illegible] is [illegible] of SO_2

70 grams used
3 " times added
2 " "

Is about right for [illegible] time
will [illegible]

is not perfectly soluble
[illegible] to [illegible] sticking

10

A thin sludge acid residue
and quite thin enough for bucking

70 grams used
1 " time

Is about right for bucking but
lie about 2 [illegible]

perfectly miscible in time

#. 11

Sample of sludge [illegible]
thing from [illegible]
[illegible] used
2 " Lime added
2 " "

It will do for [illegible] purposes with
a little lime.

soluble in Lime

12

Sample #1 sludge with some thin
sludge - (#5)
very good

13

Sample #9 with some thin sludge.
very good.

14

Sample #10 and some thin sludge -
good

15 -

Sample of #11 + some thin sludge
perfectly soluble -

Experiment on the manufacture of Parchmentized paper.
(See Hofmeister, Ann. Chem., Vol. 1, page 716).

H_2SO_4, sp. G. of 1.357 at 76°F.
used 50.5 cc H_2SO_4, 100 cc H_2O.
after mixing, it measured 142 cc.

#1
Sheet of linen paper immersed for about 1.5 seconds, and washed in a slightly alkaline water.
wet on both sides.

#2 Sheet of linen paper immersed for about 2.5 seconds, + washed in slightly alkaline water,
wet on both sides

#3 Sheet of linen paper immersed for about 3.5 seconds, and washed in slightly alkaline water.
wet on both sides

#6 Sheet immersed in acid solution for exactly 6 seconds & then washed in slightly alkaline water wet on one side only.
fair,

#5 Sheet immersed in acid solution for 10 seconds, & washed in a slightly alkaline water wet on one side only
fair,

#4 Sheet immersed in acid solution for 15 seconds, & washed in slightly alkaline water wet on one side only
no good.

#3 Sheet immersed in acid solution for 12½ seconds, & washed in a slightly alkaline water wet on one side only. no good

#8 Sheet immersed in acid solution for 15 seconds, and washed in alkaline water wet on one side only.
no good

#9 Sheet immersed in acid solution for 20 seconds, & washed in slightly alkaline water - wet on both sides
Temp. of the Thos soln, 71°7
fair,
In some of the above experiments, the paper only became heated with acid on one side, owing to the ~~opa~~ ~~itivity~~ of the repulsion between the paper & acid.

Experiment
H2 SO4 of sp g 1.390 temp 74°7
(See next page)

#10 Sheet immersed for 1 seconds washed in alkaline water, not fully immersed
no good

#11 Sheet immersed for 2 seconds washed in alkaline water - not fully immersed
no good

[illegible] 1.1.81
120 cc H_2SO_4 200 cc H_2O 2 gal.
[illegible] to 300 cc
at 111°-1.1 sp. gr. 1.390

#12 Sheet immersed for 3 seconds
washed in alkaline water, not
fully immersed.
no good

#13 Sheet immersed for 4 seconds
washed in alkaline water sheet
well immersed.
no good

14 Sheet immersed for 5 seconds
washed in alkaline water
fair

#15 Sheet immersed for 7 seconds
+ washed in alkaline water
fair

#16 Sheet immersed for 10 seconds
+ washed in alkaline water
fair

#17 Sheet immersed for 12 seconds
+ washed in alkaline water -
fair

#18 Sheet immersed for 15 seconds
+ washed in alkaline water
good

#19 Sheet immersed in acid for 20 seconds, and then washed in alkaline water

No good

#20 Sheet immersed for 25 seconds and then washed in alkaline water.

Good.

Examination of
Burns Sample of Sludge -

sample.
16, - 1.5 grams Burns sample
weighed in balanced dish
washed, by Mr. Edison, then
weighed again.
It seemed to dissolve in the
water, was filtered off.
no good

Act 5th

Experiments with #12 Sludge sample
to ascertain why it is not soluble
in Lime potash or I find a way
to make it soluble.
#12 sample is sludge as taken H2SO4
just as it is taken from the mill
it is very slow, black stuff.
It is a black black sticky mass
with a peculiar smell.

Results attended for H2SO4 -

On dissolving in Lime, about 10%
residue is left. This contains H2SO4.
The portion dissolved also contains H2SO4.

A portion was washed with water
until the water showed no more
H2SO4, it was then dried on a
steam bath, and dissolved in Lime

(Lime potash similar, no
free H2SO4).

On dissolving the washed sludge in
potash + then cleaning with Benzene
and evaporating on steam bath, the

consist of [illegible] gritty particles, resembling coke, [illegible] by the H_2SO_4.

A large quantity of residue was [illegible] black amorphous mass, having no [illegible] properties.

It is insoluble in ether, but soluble in an acid which [illegible] and unaltered by [illegible] HCl.

It is really pure carbon.

and a [illegible] glass weighing 9.560 grams was placed 900 milligrams of sludge and these were covered with Benzene and placed on steam bath until no more substance was dissolved. It was then cooled & dried & weighed.

9.680 grams
9.560

.120 | 900 :: x : 100 | 900 | 12000 | 13.3

= 13.3 %

This residue is almost entirely carbon.

After washing the sludge of its tars with benzene and the benzene removed by alcohol, the residue is soluble in chloroform, but not soluble in ether.

7. 100 grams of Pure Potash
added to water. Then H2SO4
3 grams H_2SO_4
5 " "
[illegible]
The three Tins (100 grams Pure
each) placed in steam bath
at 100° Cent. [illegible] to find
out if [illegible] lost or gain
in weight in [illegible]
[illegible] 24 hrs.

4 Biscuits made with a mixture of
50 lbs H 10 sludge and 22 lbs
lbs or oil sludge mixed with
[illegible] 1/3 flour, then remainder
of our added this prevents the sludge
from forming "balls" but it has
the disadvantage of dividing very
rapidly after it is mixed, on
account of the amount of oily
film which naturally forms a
[illegible] divider.
Baked at 350°F for 1 hour,
after it is baked it breaks
from a loaf of 4 feet, if the large
flat biscuits are used.

A piece of one weighing 97.400 grams
was placed in water to find out how
much it would absorb.
Time of immersion – 10.10 Am. Oct 11th
" " removal – 5.20 PM. Oct 11th
weighed 103.870
Gained 6.64 % water.

Assay of tails from received from Mr. Pickhan, Oct. 10th 1893

Tails H 1

2.5 grams, digested in 20 cc HCl, and HFl.

1st test 26.1 % fe

2nd " 25.6 % fe

mean 25.85 % fe chemical.

magnetic assay 12 % fe

Tails H 2

2.5 grams digested in HFl + HCl 20 cc HCl

gave 25.24 % fe chemical

magnetic assay 8.68 % fe

In standardizing permanganate solution, used 8.92 mg Fe which contains 0.129275 % fe, fe reduced in 50 cc iron mixture = 0.5 gram fe —

added 4.156 grams Fe —

added 5.081 gram Fe, first determination

" 5.088 " " " "

Standardization of Permanganate Sol.

3.325 mg. of almost bright iron wire dissolved in dilute H_2SO_4 diluted to 250 cc, 50 cc used —

4 cc.	57.2 - 65.0	(50 cc)	= 7.8 cc
57.2 - 65.1		(50 cc)	7.9 "
65.1 - 72.9		(50 cc)	7.8 "
72.9 - 80.6		(50 cc)	7.7 "

mean of 3 determinations, 7.8 cc =

1 cc = 8.526 mg fe.

80.7 - 83.8 = (20 cc) = 3.1

Same bricks were made in the #10 sludge as above, in the proportions of 1 ball per tow,
3 large flat bricks,
3 small round flat bricks

One large and one small brick placed to 560°F for 45 minutes

The small brick weighed 139.5 grams, was placed in H_2O at 6.00 P.M. to find out how much water it takes up, removed at 8.00 AM Oct 12 - weighed 142.750, takes up 4.62% H_2O

[illegible] placed to 400°F for 45 minutes do not appear to take up much water

Brick weighs 141.950 grams placed in H_2O at 11.00 Am - Oct 14th 1893, removed at 8.15 Oct 16th 1893 weighs 147.7, increased 4.05% in weight in 45 hours made in sewer press

One large and one small brick placed to 560°F for 45 minutes do not appear to take up much water - take up less than #4

Sample distributed for water absorption
weighs 138.420 grams, removed at 9.30 Am Oct 14 removed Oct 16th at 8.15 Am weighed 141.250 grams increased 2.05% in weight, in 47 hours made in sewer press

Tries bricks with #10 sludge and lime -
40 lbs sludge, 5 lbs lime,
mixes well, does not flow after [illegible] when bricked, water as thick as old water brick, and molded bricks above water.

#2
45 lbs sludge #10, 5 lbs lime, mixes well flows a little, is not sticky, crazes when bricked and takes up water before baking -

#3

30 lbs. Baltimore Sludge, 10 lbs lime, mixed in 20 lbs. water, mixed well. Dried a little after it is mixed. Did not stick. After bricking, it took up a very small quantity of water, compared with #1 & #2.

#4

30 Baltimore Sludge, 5 lbs Lime - 40 lbs this mixture for ten minutes well in 20 lbs water, somewhat sticky, but could be more so. After bricking, is water repellent.

3 bricks made as above, heated to 405°F for 30 minutes were still soft when removed. When cold, are decided water repellant.

brick weighing 143 grams placed in water at 10.00 Am Oct 13, removed at 8.30 Am Oct 14, weighed 159.1 grams increase 8.9% in weight in 22½ hours.

#5

Duplicate of #4, heated to 400°F for 1 hour, hard when removed - when cold was water repellant - a brick weighing 134.285 grams was placed in water at 4.00 PM Oct 12th 1893.

Removed at 9.15 Am Oct 13th 1893 weighed 135.810 grams, an increase of 0.88% in weight after an immersion of 17¼ hours.

Steel castings made with sand as silicate, just as they are when removed from the mould, were treated with HCl, which decomposed the silicates, and the slag was easily removed.

A large casting was supported or suspended from a trunnel and every two hours, a bath of HCl was lifted up, to immerse the casting for 1 minute.

At the end of the 6th dip there was still some hard silicate fast to the steel. The steel became badly pitted or coated with Fe_2Cl_6 by the treatment.

Oct 13th 1893

Determination of loss in #10 sludge caused by washing it until it gave no longer an acid reaction to litmus water. Old method.

Weight of small evaporating dish	34.852
" " sludge & dish	38.074
" " sludge	3.222
Weight of glass stirring rod	3.202
Weight of dry sludge & glass rod after washing	41.276
	40.244
Loss in weight	1.032
Weight of washed sludge by difference	3.222
	1.032
	2.190

3.222) 1.032000 (32.03
9666
6540
6444
9600

Loss 32 %

In another case lost nearly 50 %, but it was because a large portion of the sludge had separated. 32 % will probably be normal.

6

Washed some #10 until it gave no acid reaction to the wash water, heated it until all the water was evaporated. If it is used without evaporating the water it does not make a sticky brick, as the sludge feels it much like a lubricator.

When the water is driven off it is not so sticky even. Then made a brick with 1 pt of the dried sludge, + 5 lbs lime, it was still repellant before heating. Was heated to 395°F for 1 hour + 10 minutes, was very hard when taken out, did not give off any volatile gases. The brick was made in some press, and a fair pressure applied to it.

Weight 170.110 grams, placed in H_2O at 11.30 Oct 14th removed at 9.15 Am, Oct 16th 1893, weighed 174.550 grams, increased 2.6 % in weight in 45 hours.

Brick made from Pattinson Sludge (30 to 45), 40 lbs per ton, in iron mould, which makes a slight bit of the shining effect.

This brick was made in same press, in mould, pressure being kept to 375 # for 1 hr. 10 minutes, when removed, gas off vapor, and was not had a little bring proven off by a gentle pressure of the tongs.

The more pressure applied in making bricks, the harder they seem to be when removed from the furnace. The #6 brick described on last page ~~[illegible]~~, had a gentle pressure applied, and is fully 3 times as hard when removed from the oven. They were both placed in and removed together.

7

A brick was made with #10 sludge well washed, mixture consisting of 50 lbs sludge, 5 lbs lime, 45 lbs being used per ton. It mixing well, in sections, became fairly sticky, seemed to fall to pieces but after moulding, it absorbed water in other products, it seemed to be very good.

Brick made of Pattinson sludge #7 [illegible] had been removed brick made in hand mould by hand brick weighs 163.170 grams, placed in water at 9:00 Am, Oct 16th 1893

Removed at 4:15 Pm, Oct 17 - 1893, after an immersion of 23 1/4 hours, weighed 166.220 grams an increase of 1.25 % due to water.

#8

30 lbs of water #10 sludge for 224 lbs of pure Lima oil, mixed in water.
Not good - sand dry after mixing, would require 125 lbs per 224 lbs to be any good.

#9

Brick made with 35 lbs of washed and dried #12 sludge, 5 lbs Lima Petroleum, 4 lbs of mineral per 224 lbs ore.
Mixture well, fairly sticky. Bricks well, is quite strong, but not quite shelly. After baking placed in oven and slowly heated 400° F for 1 hours. Hard when removed. brick made in hand mould, by hand. Brick weighs 157.050 grams.
Placed in water at 9.00 Am Oct 16th 1893
Removed 2.15 Pm Oct 17th 1893, after an immersion of 23 1/4 hours. weighed 160.220 grams. An increase of 2.02 % due to water.

Oct 16th

Experiments on sample # 11
of Burnt Sludge and sample
from Rose Island, E. F. Cove.

10

Was removed from jar, smelled
strongly of SO_2

[illegible] not lime in the
preparation of 30 - 10,
used 40 lbs fuel
[illegible] slight smell when
removed [illegible]

11

used 30 lbs #11 sludge with 15 lbs
lime. The sludge seems to have
oxidized, as it does not appear
to be perfectly soluble in dilute acid.
When mixed with the air, the
mixture is not sticky, and when
kicked in hand would by hand
the brick cracks as 30 water dries.
When made into screw press,
appears to be all right.
Brick made in screw press -
Sp. Gr. 1.0107 for 1 hour. It gave
offensive vapor when removed
After cooling it weighed 163.2 grams
placed in H2O at 4.15 PM. Oct 16th
Removed at 8.15 AM, Oct 17th 1893, after an
immersion of 12 hours. Weighed 166.03 gm
an increase of 1.73% due to water

#12

30 lbs #11 sludge, 12 lbs Lime,
42 lbs used per ton.
mixes well, when bricked by hand,
splits, is all right when bricked
in press.
Yellow when mixed, when bricked
before baking is water repellant,
is quite sticky.
Brick made in press.
heated to 410° F. for 1 hour, did
not fire off volatile matter
when from furnace.
After cooling it weighed 142.975 grams,
placed in H_2O at 4.15 PM Oct. 16th
Removed 8.15 AM Oct. 17th 1893 after an
immersion of 12 hours. Weighed 145.330 grams
an increase of 1.64 % due to water.
no good if made by hand.

#13

35 lbs #1 sludge, 5 lbs lime
40 lbs per ton.
mixes well, "flows" well is sticky
when bricked is water repellant,
made in hand moulds, by hammer
is water repellant.
heated to 410° F for 1 hour.
brick made by hammer.
when removed from furnace it
still gives off volatile matter, which
soon stopped.
After cooling it weighed 113.750 grams
placed in water at 2.30 PM Oct 17th
Removed at 8.45 AM after an immer-
sion of 18 1/4 hours weighed 115.330 grams
an increase of 1.3 % due to water

#14

Brick made with a mixture of 30 lbs #11 sludge, 12 lbs lime Pulos, using 50 lbs of this mixture for 1 foot.
Brick well, dries very well does not crack by hammer in small mold, "Flow" well, is water repellant.
Brick made by hammer.
Dried to 110° F. 1 hr.
Then removed for furnace still warm from mold, which was 100° F.
After cooling, weighed 127.420 grams, placed in water at 2:30 PM, Oct 17th removed at 8:45 Am, Oct 18th after an immersion of 18 1/4 hours weighed 130.300 grams.
An increase of 2.26 % due to water.

#15

Brick made with a mixture of 30 lbs #11 sludge, 12 lbs lime, using 45 lbs water.
Mixture pretty well, is not very sticky, has a tendency to crack when dried by hammer, although it does not crack along lines.
"Flow" fair well.
When dried by hammer, is water repellant, although the surface is not.
Dried by hammer.
After cooling, weighed 116.210 grams, placed in water at 2:30 PM.
removed at 8:45 Am, Oct 18th after an immersion of 18 1/4 hours weighed 118.950 grams.
An increase of 2.35 % due to water.

#16

75 lbs #27 sludge unwtr
well ground up to 1 to 2
mesh

#17

75 lbs #27 sludge, well ground
5 lbs Lima,
2240 lbs ne –

ne grind

#18

50 lbs #27 sludge, well ground
10 " molasses
2240 " Clay

no good -

Mixed some well ground #27 with Resinate of Soda,
10 grams Resinate
10 grams #27 Sludge,

seemed to form a coalescence mass, which on heating with lime, soda [illegible] with flame, carbon [illegible] residue. The #27 separated out again while the Resinate dissolved in the Lime.

Boiling Caustic Soda strong sol. does not seem to have any action on thoroughly washed #27 residue.

The residue after treatment with Na_2O is soluble in Turpentine.
Turpentine cost 4 cts per lb.
An adding lime to its turpentine solution the sludge ppts.

Unwashed Tacoma sludge can be ground up with a small amount of turpentine [illegible] and make a stiff mass of upon heating but 20 drops of Lima or Pennsylvania petroleum left the sludge.

#1

3 Parts 27 Sludge which has been heated with $Na_2O + H_2O$ and 1 part Rosin Oil, well ground together and heated.

#2

Washed 27 Sludge and Rosin Oil heated. (Sludge not treated with Na O)

3

#27 Sludge washed & treated with Na O dissolved in Turpentine requires an excess of turpentine

(See further after exp't # 25)

#19

50 lbs # 19 Sludge,
1 tem Oil

no good

20 -

50 lbs #19 Sludge
Lime -
1 ton ore -

no good -

21

75 lbs # 19 Sludge
1 ton Ore

no good

22

75 lbs # 19 Sludge
5 " Lime
1 ton Ore

no good

can be leached, but is very weak, & absorbs water.

23

75 lbs # 19 Sludge
10 " Lime
1 ton Ore,

no good

can not be leached without crushing, absorbs water.

24

100 lbs H 19 Sludge
1 ton of ore

mixes well, cancel bucket
but brick is weak, & absorbs
water.

25

100 lbs #19 Sludge
5 " Lime
1 ton Ore

mixes well, brick is good
is weak, & absorbs water

(In each case, 2 [illegible]
#19)

#4

5 lbs #27 treated with Na_2O
1 " Rosin Oil -
ground in mortar, not heated

5

5 lbs #27 Treated with Na_2O
1 lb Rosin Oil
4 " Lima Petroleum

6

5 lbs #27 treated with Na_2O
1 " Rosin Oil
2 " Lima -
30 lbs this sample per ton
no good

7

4 lbs #27 treated with Na_2O
1 " Rosin Oil -
30 lbs per ton
no good

8

4 lbs #27 treated with Na_2O
1 lb Rosin Oil -
40 lbs per ton, no good -

(In this exp't, rosin Oil was x 12 oz)

#9

#27 Sludge treated with Na_2Cl_3
dissolved in turpentine.

#10

#27 Sludge treated with Na_2O melted with
an equal weight of Rosin.
it formed a flask bottle mass
Sludge separates on dissolving in Lima Oil
" " " " " Lima "

Sludge does not separate on dissolving in benzine, unless turpentine is added. Sometimes, upon shaking the sludge, ppt. in a fine liquid state, showing that it is mixed or emulsified.

is insoluble in naphtha

Sludge separates on dissolving in benzine.
" " " " kerosene
" " " " " gasoline

Asphalt is insoluble in benzine, gasoline, kerosene & naphtha. Sludge ppts. from benzine.

Incompletely soluble in Toluol

insoluble in NaOH hot & cold.

is completely soluble in coal tar, forms a sticky mass

#27 Sludge treated with NaOH is completely soluble in coal tar.

#11

#27 Sludge treated with NaOH 2 parts
Coal tar 1 "
mixed on steam heater,
it is insoluble in lima Petroleum

Coal tar is soluble in
Benzole
Toluol
Turpentine
Room Chl
Chloroform
is insoluble in
naphtha
Gasoline
Benzine
Alcohol
Lima Petroleum
Lima Petroleum
can be mixed with strong
caustic soda.

200 grams of #30 sludge washed was ground up, and washed until it gave no further sulphate test, with $BaCl_2$ solution, & dry wgt. of weight 175 grams, a loss of 12½ %

#12

Grind a portion of the sludge also with dry slaked lime in agate mortar, then [illegible] as sludge.

13

Portion of washed #30 sludge ground with an equal weight of $CaCO_3$, and heated.

#14

Portion of washed sludge ground with an equal weight of Plaster of Paris, & heated.

15

Portion of #30 washed sludge ground with an equal weight of Cu_2O and sulphur, and heated.

16.

Portion of washed #30 sludge, ground with an equal weight of calcium sulphide, & heated.

17

[illegible] washed + boiled with also an equal weight of [illegible] calcined in a "muddy" state. Mr Edison thought the previous chemical reduce it to a [illegible] [illegible] instead, [illegible] to [illegible] [illegible]

The combination is not effective because [illegible] the sludge divides [illegible]

18

Some #30 sludge washed, well ground with an equal weight of hydrated Sodium Hypo-Sulphite

19

Some #30 washed sludge, well ground with an equal weight of Soda Lime.

20

Some #30 washed sludge, well ground and heated with an equal weight of Sodium bisulphite

21

Some #30 sludge, washed + well ground + heated with an equal weight of [illegible] Sodium acetate.

22

Some #30 sludge washed, well ground with an equal weight of Common salt, heated the mixture.

23

Some #30 Sludge washed + well ground with an equal weight of Sodium Carbonate, hydrated + heated.

24 -

Same #30 sludge, mixed, well ground & treated with equal weight of Dry Soda Nitrate

25

Same #30 mixed sludge, well ground & treated with sodium sulphide, with weight used.

26

Same #30 sludge, mixed, & well ground & treated with one - Sodium Nitrate

27

make duplicate of #21 - added ~~some~~ Penna Petroleum in the proportion of 30 lbs #21 - 5 lbs Penna, and 35 lbs of this per ton of ore

was good, was dry, quite much of a difference of a little oil in it. Coal had to be broken,

28

duplicate of #25 30 lbs - Penna Petroleum - 5 lbs Soda & Tar - gently & added to 1 ton of ore

was good as dry, does not hold its shape when broken it falls to pieces in taking from the mould.

29

[illegible] 30 lbs, 5 lbs. [illegible]
lbs, [illegible]
[illegible] falls to pieces
[illegible] mould.

30

Duplicate #25, 30 lbs, 3 lbs
Coal Tar, mixed, warmed, &
mixed with 1 lb. [illegible]
Coating the coal tar, & heating it
to spread the sludge from the mass
and it became somewhat sticky,
no good, falls to pieces in
removing from the mould.

31

Duplicate #25 - 30 lbs, Rosin
10 lbs - warmed, well ground together in
a mortar, warmed again & mixed
with 1 lb. oil.
no good does not hold its
shape.

32

Duplicate # 31, 30 lbs, 5 lbs Rosin
10 lb, mixed well, warmed to make
more fluid, & mixed with one
ton of oil.
no good - falls to pieces on
removing from mould.

33

duplicate #21, 30 lbs, 5 lbs coal tar, no good, [illegible] of mold [illegible] [illegible].

34

duplicate #21, 30 lbs, 5 lbs rosin, 5 lbs pitch - well ground, & heated gently - mixed with 1 ton air.

No good, fails to pierce box, sticking from mould.

35

equal weights of #30 washed sludge, and Potassium Sulphide well ground and heated.

36

equal weights of #30 washed sludge, and Potassium ferro cyanide, well ground and heated.

37

Equal weights of #30 washed sludge and Potassium Cyanide, well ground and heated -

38

[illegible] 1/4 its weight [illegible] ground [illegible] gill [illegible]

39

#30 washed sludge, ground & heated with an equal weight of H_2SO_4 Acid only dried

40

#30 washed sludge, ground & heated with an equal weight of $BaSO_4$

41

#30 washed sludge, ground & heated with an equal weight of $BaCO_3$

Oct. 25th 1893

Tested Lime with the following substances in pot dishes.

50 grams Lime, 5 grams $BaCl_2$ heated to gentle boiling.

50 grams Lime, 5 grams HFl, heated in coated dish to gentle boiling

50 grams Lime, 5 grams P_2O_5, heated to gentle boiling.
The Cl has been completely combined seems like a sludge, but has no smell

50 grams Lime, 5 grams Arsenic Acid heated to gentle boiling.
On Mar 19th 1894 this mixture smells like a fatty acid.

saturated

43

#30 sludge washed ground & heated with an equal weight of BaOH

43

#30 washed sludge ground & heated with an equal weight of BaO_2

44

#30 washed sludge ground & heated with an equal weight of BaS

45

#30 washed sludge, ground & heated with an equal weight of $(NH_4)_2SO_4$

46

#30 washed sludge, ground & heated with an equal weight of Al. Cl.

47

#30 washed sludge ground & heated with an equal weight of ammonium alum.

48

#30 washed sludge, ground & heated with an equal weight of Alum. Chlorine

49

#30 washed sludge, ground & heated with Na Cl

50

#30 sludge, washed, ground & heated with an equal weight of aluminum fosmate

51

#30 washed sludge, ground & heated with an equal weight of cryolite.

52

#30 washed sludge, ground & heated with an equal weight of Infusorial earth.

Oct 26 - 1893.

Experiments on the treatment of Sawdust with 1/2 its weight of H_2SO_4 of 1.66 sp. G. contains some water extra. The sawdust passed through a 12 mesh sieve to take out chips etc.

#1

20 grams H_2SO_4 of 1.66 sp.g.
40 " fine sawdust
mixed and heated in the boiling water bath. heated longer than the other 1/2 until it was very dry. to driff SO_2.

Experiments on bricks made with sulphuric acid.

#1

1 ton ore,

100 lbs of a 10% sol. of H_2SO_4 by weight placed in dish & heated on sand bath

not good.

#2

1 ton Ore –

50 lbs. 10% sol. H_2SO_4 by weight –

mixture dished & marked #2. heated on sand bath

no good

#3

1 ton Ore

50 lbs of a 20% sol H_2SO_4 by weight

no good

#4

1 ton Ore –

25 lbs – of a 20% sol H_2SO_4 by weight

no good

#5

1 ton ore -
50 lbs of a 40% sol H_2SO_4 by weight.

#6 -

100 lbs of a 50% sol of crystallized $FeSO_4$
1 ton Ore.

#7

25 lbs H_2SO_4, sp gr 1.66
1 ton Ore -

#8

50 lbs of a 50% sol crystallized $FeSO_4$
1 ton ore -

#9 containing

25 lbs of a 50% sol $FeSO_4$
1 ton ore -

10

about 10 cc of a 1:1 sol. of sulphuric
of aluminum -
225 grams ore.
is about equal to
150-200 lbs conc. sol Al_2SO_4
1 ton ore.

#11

100 lbs of a 25% sol of Al_2SO_4
1 ton Ore -

12

200 lbs of a 20% sol H_2SO_4
1 ton ore -
Acid poured on ore.

13

300 lbs of a 10% sol of H_2SO_4
1 ton Clu.

Clot – 30th

225 lbs Clu –
4 lbs La mixture of 30 lbs sludge
and 5 lbs lime.
Bricks made in square mould, having
plane surfaces at each side,
were heated to 440° for 1 hour when
removed, were slightly off.
More were heated to 560° for 1
hour, were not quite burnt in
removed, + still gave off sufficient of
sludge acid.
Remainder were heated to 560°7
until no more vapors were
given off, required 3 hours.
When cold one brick was
thrown in the air as follows
6 feet, did not break.
12 " " " "
25 " " " "
75 " " " " but the
corners were knocked off.
In each case, it fell on a
wood floor.
In heating the bricks vapors do not
seem to be given off as heavy fumes
until after a temp of 425°7 has
been reached, or at 400°7 after a

much longer time.
A lot of bricks heated to a temp of
[illegible] Lime vapors
stopped coming off.
All stands all night except
[illegible] as high as the main
[illegible] building and fell in the
used [illegible] outside of chemical room.
They only slipped a little at the corners.
A little of the brick weighing 85.170
grams was placed in water at 10.30 am
Nov 3rd 1893 to test as to minute
water is absorbed.
Removed at 9.30 AM. Nov 4th 1893 weighed
88.610 grams, an increase of 4.4% due
to water.
Brick heated to 500°F for about 1 hour
gases still came off.
Portion of it weighed 53.010 grams.
placed in H2Oad 3:45 Nov 8th 1893
Removed at 3:45 PM. Nov 9th weighed 54.9
an increase of 3.46% due to water

50 grams Dexter gold sand
treated with chlor. + assayed
by Lead chlor
50 grams ore } mixed
200 " Lead
5 " Borax
50 " Lead

100 grams Burnham Old sand assayed
50 " per scorifier } mixed
200 " Lead
5 " Borax
50 " Lead on lip.

Examination of a mineral
received from Carbon & Centre
N. Alberta, N.W.T.

Appears to be fine-grained opaque white
[illegible] H_2O, Al_2O_3, SiO_2, $CaCO_3$
The mineral is of a light green
[illegible] specific gravity, has a hard
[illegible] and contains no [illegible] SiO_2

[illegible] H_2O, Al_2O_3 and
[illegible] which [illegible] H_2O
[illegible]

#1 Nov 9th 1893

Cylinder [illegible] in the oven & heated to 500°F for 1 hours.
did not give off gases on removing from furnace.
Defiant 50 feet fell in wood-
for water test, see under #5

#2
brick heated to 450° for 1 hour,
gave off gases on removing from furnace.
defiant 50 feet fell on iron
for water test, see under #5

#3
brick heated to 400°F for 1½ hours
still gave off vapors when removed from the oven, but it was hard to the tongue
broke at 50 feet fell on wood
for water test, see under #5

#5
brick heated to 400°F for 1 hour
did not give off any gases on removing from the furnace, was hard when removed.
Defiant 50 feet fell on wood-
pattern weighed 28.440 grams Removed at 12:00 Nov 11
" 29.250 grams an increase of 2.84% in 22 hours, due to water

---

Tests of #1-2-3-4, in water
Immersed at 2:00 P.M. Nov. 10th

#1 - weighs 26.990 grams Removed at 12:00 Nov 11
" 28.700 " an increase of 6.39% in 22 hours due to water
#2 weighs 30.690 grams Removed at 12:00 Nov 11
" 31.310 " an increase of 2.46% in 22 hours, due to water
#3 weighs 22.720 grams Removed at 12:00 Nov 11
" 23.430 " an increase of 3.12% in 22 hours, due to water
#4 weighs 34.230 grams Removed at 12:00 Nov 11
" 35.000 " an increase of 2.9% in 22 hours, due to water

A [illegible]
[illegible] sheet

[illegible] first examined (at 11:00 AM
Nov 10th 1893) the water showed that —
[illegible] the liquid indicated
by the concave surface of the liquid.

at 11:00 AM , at 2:00 PM. at 4:30 PM

At 2:00 PM Nov 10th 1893 the water
[illegible] showing that absorption
had taken place.
at 4:30 PM Nov 10th 1893 the ~~water~~
~~had~~ ~~Broth~~ had become capillary
as shown by the sketch.

No 15th

Experiment to ascertain how long a piece of paper lasted. The hard end of paper only immersed

10% sol.

# 1 - 1 sec	no good
# 2 - 2 "	" "
3 - 3 "	" "
4 - 4 "	" "
5 - 5 "	" "

20% sol

6 - 1 sec	no good
7 - 2 "	" "
8 - 3 "	" "
9 - 4 "	" "
10 - 5 "	" "

30 - % sol

11 - 1 sec	no good
12 - 2 sec	" "
13 - 3 "	" "
14 - 4 "	" "
15 - 5 "	" "

40% sol

16 - 1 sec	no good
17 - 2 "	" "
18 - 3 "	" "
19 - 4 "	" "
20 - 5 "	" "

50% sol

21 - 1 sec	no good
22 - 2 "	" "
23 - 3 "	" "
24 - 4 "	" "
25 - 5 "	" "

60% sol

26 - 1 sec	no good
27 - 2 "	" "
28 - 3 "	" "
29 - 4 "	" "
30 - 5 "	" "

70% sol

31 - 1 sec	no good
32 - 2 "	" "
33 - 3 "	" "
34 - 4 "	" "
35 - 5 "	" "

80% sol

36 - 1 sec	no good
37 - 2 "	" "
38 - 3 "	" "
39 - 4 "	fair
40 - 5 "	"

90% - sp.g. 1.71

41 - 1 pure — fair
42 - 2 " — "
43 - 3 " — "
44 - 4 " — "
45 - 5 " — "

H2SO4 sp.g. 1.81

46 - 1 pure — no good
47 - 2 " — no good
48 - 3 " — " "
49 - 4 " — " "
50 - 5 " — " "

Examined the [illegible] variety
[illegible] Lysol of the Lysol Chemical Company

Does a hard black little way,
heavier than water.
Is not completely soluble in boiling
alcohol, a black mass remains at
the bottom to which the odor is due.
The boiling alcohol removes a considerable portion which on cooling
separates out in minute non
crystalline bulky masses.
A portion of the original substance
melted, and heated quite hot gave
vapors very much resembling thymic
acid vapors, both in appearance &
odor.
To some of the boiling alcohol solution
some HCl was added, & then H_2O was added,
after cooling was filtered, filtrate
was perfectly clear.
Ammonia added to HCl filtrate produces
a ppt of Al_2O_3
H_2S by gas gave yellow ppt, potash,
[illegible] meta antimonate gives
ppt of soda.

3 grams weighed out to be separated
dissolved in alcohol
Beaker & portion soluble in alcohol
weighs 17.600 grams
Beaker weighs 15.217 grams
Portion soluble in alcohol weighs
2.383 grams
Portion insoluble in alcohol weighs
0.617 grams.

No. 15th

Assay of Cleveland's American Iron for Titanium.

Two assays made, 50 grains each, digested in HCl.

Nov 17th

Sodium Resinate carrying strength of the following proportions, to be used for solutions in Yelande Batteries

#1

180 cc H_2O
24 gm Na_2OH (Yelande Soda)
136 " Resin

Add resin to water, add slowly 160 cc H_2O, hot.

Check [illegible] the 24 grams Na_2OH in 160 cc H_2O, by heat, it contracts to 145 cc & weighs 180 grams.

Made stock solution of 900 cc H_2O, 120 grams Na_2OH = 1020 grams, weighed 1040 grams.
208 grams (1/5) ~~weigh~~ = 184 cc -

#1

40 cc stock sol Na_2OH + 50 cc H_2O
90 " H_2O hot
65 grams Resin
0.1 volt

#2

50 cc stock sol in H_2O + 50 cc H_2O
75 " H_2O - 25 cc stock, hot -
65 grams resin
- 75 - 50 -
75 H_2O

#3

75 cc - stock - 50 H_2O
75 cc - H_2O
65 Resin

4

50 cc stock 50 cc H_2O
6.5 grains Resin
0.08 not cut

5

50 cc stock or C. 50 cc H_2O
6.5 grains Resin
50 cc H_2O

gave 0.1 not cut

6

60 cc stock sol 50 cc H_2O
6.5 grains
50 H_2O
~~not good~~

Nov. 18th 1893

Immersed my fore finger of the left hand, to a depth of about 2 3/4 inches, in 60 cc. of absolute ethyl alcohol to find how much fat would be dissolved out in 1 hour.

The following sensations were produced. Immersed at 8.10 A.M. At 8.15 The finger feels dry and parched. It is most uneasy at the end, especially under the nail. At 8.18 the finger feels stiff. at 8.30 The finger feels as if it was under an air pump, a sensation of line strength sucked. at 9.05 finger feels normal, except around & under the nail where a sucking sensation is felt. Finger removed at 9.10, after removing, feels quite stiff and the skin is white as the death. The flesh had not gone down much, the finger did not feel right again for over 24 hours.

Weight of imprinting disk 26.7105 fat weighs
Weight of " " " + fat 26.7144 0.0039 gm

[illegible]
[illegible] weighed
26.707 grams
26.7144
26.7070
0.0074 grams weight of fat.

Nr 20 a

Immersed forearm in Mr. Mellis
[illegible] for 1 hour to find out
how much fat would be deposited
on it. The following sensations were
noted.
Finger immersed in 6 o.o at
10.30 Am.
at 10.40 fingers begin to feel stiff
at 10.50 fingers begin to feel "
a stinging smarting which contin-
ues all the time of immersion
at 11.00 a sucking sensation
is felt.
at 11.20 fingers feels very stiff
Removed at 11.35.
alcohol evaporated.
Weight of glass + fat, 26.726 grams.
" " " 26.705
0.021 "

10 gr.

analysis of rocks by Sherrill, and Van Edin by Alex. Ellis & Co.

iron	no
nickel	" copper
phos	" tungsten
silica	" molybden
titanium	" vanadium
manganese	" zinc
arsenic	" nickel
[illegible]	" cobalt
	" silver
	" mercury
	lead
	" bismuth
	" cadmium
	" gold
	" thallium
	" [illegible]
	" [illegible]
	" gold
	" tin
	" antimony
	" platinum
	" iridium

Found in our first hundred
flakes we took 30 grains being
[illegible] marks for determin-
[illegible]

Experiments for Lamp for
Phonograph cylinders

H 1 10 grams Trinidad asphalt
No good

H 2 10 grams Trinidad, 10 mg. Soda
hydrate
no good

H 3 10 grams Trinidad, 10 mg
soda hydrate, 2 grains
ozokerite.
no good

4 10 grams Trinidad, 20 mg
soda Hydrate, 3 grams Ozokerite
no good

5 – 5 grams Trinidad 20 mg
soda hydrate, 2 grams Ozokerite
No good

6 – 5 grams Trinidad, 20 mg soda
hydrate, 3 grams Ozokerite.
fair

7 – 5 grams Trinidad, 20 mg soda
hydrate, 3 grams Ozokerite
fair

8 – 5 grams Trinidad 20 mg Soda
Hydrate, 3 grams ozokerite
no good

9 - 5 grams trinidad, 2 grams Ozokerite, 2 grams syrian, 20 mg NaOH
no good

10 - 5 grams trinidad, 3 grams Ozokerite 3 grams syrian 25 mg NaOH. fair

#11 5 grams trinidad 3 grams Ozokerite, 2 grams syrian 25 mg. NaOH,
no good

12 - 5 grams trinidad 2 grams syrian, 20 mg NaOH
no good

13 - 5 grams trinidad, 2 grams soft mexican, 20 mg soda Hydr.
no good

14 - 5 grams trinidad, 3 grams soft mexican, 20 mg Sodalyde
no good

15 - 3 grams trinidad, 3 grams soft mexican, 2 grams ozokerite, 20 mg Soda Hydrate
no good

16 - 5 grams trinidad, 3 grams soft mexican, 3 grams ozokerite 20 mg soda hydrate
not good

17 - 5 grams trinidad, 3 grams mexican soft, 4 grams ozbinite, 25 mg. soda.
no good

18 - 5 grams trinidad, 4 grams mexican, 1 gram ozbinite 20 mg NaOH
no good

19 - 5 grams trinidad 3 grams mexican, 5 grams ozbinite 20 mg NaOH
moderate

20 5 grams trinidad 4 grams mexican 5 grams ozbinite 20 mg. NaOH
no good

21 - 5 grams trinidad, 5 grams soft mexican 5 grams ozbinite 20 mg NaOH
no good

22 - 5 grams trinidad, 5 grams soft mexican, 20 mg NaOH
no good

23 - 5 grams trinidad, 5 grams soft mexican, 1 gram ozbinite, 20 mg NaOH no good

24 5 grams trinidad, 5 grams soft mexican, 2 grams ozbinite, 20 mg. NaOH
no good

25 - 5 grams + 1d. 1 gram soft mexican 1 gram syrian 20 mg NaOH
no good

26 5 grams trinidad, 1 gram soft mexican, 2 grams syrian 20 mg NaOH
no good

27 5 grams trinidad, 1 gram soft mexican, 3 grams syrian 20 mg NaOH
fair

28 5 grams trinidad 1 gram soft mexican, 4 grams syrian 20 mg NaOH
no good

29 5 grams trinidad, 1 gram soft mexican, 5 grams syrian 20 mg NaOH
no good

30 5 grams trinidad, 2 grams soft mexican, 1 gram syrian 20 mg NaOH
no good

31 5 grams trinidad, 2 grams soft mexican, 2 grams syrian - 20 mg NaOH
no good

32 5 grams trinidad, 2 grams soft mexican 3 grams syrian 20 mg NaOH
no good

33 – 5 grams Trinidad, 2 grams soft mexican, 4 grams syrian 20 mg NaOH

34 – 5 grams trinidad 2 grams soft Mexican, 5 grams syrian, 20 Mg NaOH

35 – 5 grams trinidad, 3 grams soft mexican, 1 gram syrian 20 mg NaOH

36 – 5 grams trinidad 3 grams soft mexican, 2 grams syrian 20 Mg NaOH.

37 – 5 grams trinidad, 3 grams soft Mexican, 3 grams syrian 20 mg NaOH

38 – 5 grams trinidad, 3 grams soft mexican, 4 grams syrian 20 mg NaOH

39 – 5 grams trinidad, 3 grams soft mexican, 5 grams syrian 20 mg NaOH

40 – 5 grams trinidad, 4 grams soft Mexican, 1 gram syrian, 20 mg NaOH

41 - 5 grams Trinidad, 4 grams soft Mexican, 2 grams syrian 20 mg NaOH

42 - 5 grams Trinidad, 4 grams soft Mexican, 3 grams syrian 20 mg NaOH

43 - 5 grams Trinidad, 4 grams soft Mexican, 4 grams syrian 20 mg NaOH

44 - 5 grams Trinidad, 4 grams soft Mexican, 5 grams syrian 20 mg NaOH

45 - 5 grams Trinidad, 5 grams soft Mexican, 1 gram syrian 20 mg NaOH

46 - 5 grams Trinidad, 5 grams soft Mexican, 2 grams syrian 20 mg NaOH

47 - 5 grams Trinidad, 5 grams soft Mexican, 3 grams syrian 20 mg NaOH

48 - 5 grams Trinidad, 5 grams soft Mexican, 4 grams syrian 20 mg, NaOH

49 - 5 grams Trinidad, 5 grams soft Mexican, 5 grams syrian 20 mg NaOH.

50 – 5 grams Trinidad 1 soft Mexican, 1 Rosin, 20 mg soda
no good

51 5 grams Trinidad 1 soft mexican, 2 Rosin, 20 mg NaOH
no good

52 5 grams Trinidad 1 gram soft mexican, 3 Rosin, 20 mg NaOH
no good

53 5 grams Trinidad 1 gram soft mexican, 4 Rosin, 20 mg NaOH
no good

54 – 5 grams Trinidad, 1 gram soft Mexican 5 grams Rosin 20 Mg. NaOH
no good

55 – 3 grams Trinidad 2 grams soft mexican, 1 gram rosin 20 mg NaOH
no good

56 – 5 grams Trinidad, 2 grams soft mexican 2 grams rosin, 20 mg NaOH
no good

57 – 5 grams Trinidad 2 grams soft mexican, 3 grams rosin 20 mg soda
no good

58- 5 grams trinidad, 2 grams soft mexican, 4 grams rosin 20 mg NaOH
no good

59 5 grams trinidad, 2 grams soft mexican 5 grams rosin - 20 mg NaOH
no good

60 5 grams trinidad 3 grams soft mexican, 1 gram rosin 20 Mg NaOH
no good

61 - 5 grams trinidad, 3 grams soft Mexican, 2 grams Rosin, 20 mg NaOH
no good

62 - 5 grams trinidad, 3 grams soft mexican, 3 grams Rosin, 20 mg NaOH
no good.

63 - 5 grams Trinidad, 3 grams soft mexican, 4 grams Rosin, 20 mg NaOH
no good

64 - 5 grams Trinidad 3 grams soft mexican, 5 grams Rosin, 20 mg NaOH
no good

65, 5 grams trinidad, 4 grams soft mexican, 1 gram rosin, 20 mg NaOH
no good

66 - 5 grams trinidad, 4 grams soft mexican, 2 grams rosin, 20 mg NaOH
no good

67 - 5 grams Trinidad, 4 grams soft mexican, 3 grams rosin, 20 mg NaOH
no good

68 - 5 grams Trinidad, 4 grams soft mexican, 4 grams rosin, 20 mg NaOH
no good

69 - 5 grams Trinidad, 4 grams soft mexican, 5 grams rosin, 20 mg NaOH
no good

70 - 3 grams Trinidad, 5 grams soft mexican, 1 gram rosin, 20 mg NaOH
no good

71 - 5 grams Trinidad, 5 grams soft mexican, 2 grams rosin, 20 mg NaOH
no good

72 - 3 grams Trinidad, 5 grams soft mexican, 3 grams rosin, 20 mg NaOH
no good

73 - 5 grams Trinidad, 5 grams soft mexican, 4 grams rosin, 20 mg NaOH
no good

74 - 5 grams Trinidad, 5 grams soft mexican, 5 grams rosin, 20 mg NaOH
no good

75 - 5 grams Trinidad, 1 gram pitch, 1 gram cumarula, 20 mg NaOH
no good

76 - 5 grams Trinidad, 2 grams pitch, 1 gram cumarula, 20 mg NaOH
good

77 - 5 grams Trinidad, 3 grams pitch, 1 gram cumarula, 20 mg NaOH
no good

78 – 5 grams trinidad 4 grams pitch
1 gram camauba, 30 mg NaOH
no good

79 5 grams trinidad, 5 grams pitch,
1 gram camauba 30 Mg NaOH
no good

80, 5 grams trinidad 1 gram pitch,
2 grams camauba, 30 mg NaOH
no good

81, 5 grams trinidad, 2 grams pitch
2 grams camauba, 30 mg NaOH
no good

82 5 grams trinidad, 3 grams pitch,
2 grams camauba 30 mg NaOH
good cost 2.8 cts lb.

83, 3 grams trinidad, 4 grams pitch
2 grams camauba 30 mg NaOH
good cost 2.6 cts lb

84 5 grams trinidad, 5 grams
pitch, 2 grams camauba, 30 mg NaOH
no good

85, – 5 grams trinidad 1 gram pitch,
3 grams Camauba 30 mg NaOH
no good

86 – 5 grams trinidad 2 grams pitch,
3 grams camauba, 30 mg NaOH
fair,

87 – 5 grams trinidad 3 grams pitch
3 grams camauba 30 mg NaOH
good cost 3.3 cts

88, 5 grams trinidad 4 grams pitch
3 grams camauba, 30 mg NaOH
good 3.8 cts lb

89 5 grams trinidad 5 grams pitch
3 grams camauba, 30 mg NaOH
fair,

90, 5 grams pitch, 1 grams soft mexican, 1 gram carnauba, 30 Mg. NaOH
fair,

91, 5 grams pitch, 2 grams soft mexican, 1 gram carnauba, 30 mg NaOH
fair,

92, 5 grams pitch, 3 grams soft mexican 1 gram carnauba, 30 mg NaOH
good 3 1/4 cts Cl

93, 5 grams pitch, 4 grams soft mexican, 1 gram carnauba 30 mg NaOH
good 3.27 cts cl

94 - 5 grams pitch, 5 grams soft mexican 1 gram carnauba 30 mg NaOH
good 3.45 cts

95, 5 grams pitch, 1 grams soft mexican, 2 grams carnauba 30 mg NaOH
good 3.34 cts

96 5 grams pitch, 2 grams soft mexican 2 grams carnauba 30 mg NaOH
good 3.64 cts

97 - 5 grams pitch, 3 grams soft mexican 2 grams carnauba, 30 mg NaOH
good 3.67 cts

98 5 grams pitch, 4 grams soft mexican 2 grams carnauba 30 mg NaOH
no good

Rosin 1/2 ct	lb -
Soft Mexican	5 cts
Cuban, soft	4.5
" hard	4.—
Trinidad	1 1/2
Pitch (coal tar)	3/4 - 1 ct
Ozokerite	7 cts
Syrian	8 cts - 10 cts
NaOH	3 cts
Carnauba wax,	9 + cts

100 - duplicate of #99 75 mg NaOH
fair,

99 - 5 grams pitch, 5 grams soft mexican, 2 grams carnauba 30 mg NaOH
good 3.9 cts

In verifying the if the assay does not give litharge refuse, pour out, remove slag, add fresh borax, cut down until it does scorify. do not heat too much or blow out at, it must be hot enough so that no litharge remains on the surface - but skim as fast as it is formed.

In cupellation if a thick non volatile crust of PbO forms place some charcoal in front of the cupel & open the door slightly wide.

In a few minutes, the PbO is removed & the oxidation goes on nicely.

In an Orange heat is about the proper temp.

$7e\,SO_4 = 7e_2\,SO_4 +$

$7e\,SO_4 = 7e_2\,(CO_4)_3$

$7e\,SO_4$

$7e\,SO_4$

$SO_4 + H_2O = H_2SO_4$

7.95 85
86.610
85.170
3.440 / 85.17 / 344.000 (4
340680
3320

.05814
156
34884
29070
581.4
91.6784

$Na_2CO_3 + 10H_2O$ = 286
Na_2CO_3 = 106

500 2240 / 5200 (2.23
4480
5200
4480
7200

2.23 lbs 1 cf.
2.23 / 10.0000 (4
9.92

500 / 2240.00 (4.0
2000
240

Weight of small pitcher . 451 gm
" " large " 585 "
" " dish 157 "

645 865
451 585
194 280

103 870
97.400
6.470

97.4 / 6.470 (0.64
8441
6660
5844
4160

$Na_2CO_3 + 10 aq$ = 180
40
106 12
106 : 286 x 15 46
530 286
106
286 / 1590 (5.56
1430
1400
1430
1700

50 grams of 5 mesh furnace ashes from Scranton anthracite coal was treated with a 10% sol. of the SO2 as a steam bath for 1½ hours

Assay of a Zinc Ch. -
digested in HCl, left a fine silica residue -
treated with H2S after some time, gave ppt of sulphur indicating Fe in ferric state
filtered boiled, added NH4OH, gave fawn ppt of Fe2O3 -
addition of (NH4)2S gave no ppt, no zinc -

Contains Fe, Al.

Assay of Alloy of Fe & Ni

Weight 0.3185 grams

118
118
1

59
32
1 | 3 5 9 0 0 (65
346
460

Crucible weight 12.335

12.715

0.380 grams Fe₂O₃

112
112
172

70

380
65
1900
2280
47
6531
4

112 | 380 (65
112
680
680
380
380
380

0.80319
0.80319
88.3509

137
12
48

197) 504.000 (2.5
394
1100
985
1150

137
14
1

154) 504.000 (3.28
462
420
308
1120

1.1.1 0.80319
0.80319
0.80319
81.15409

17.3) 1.000000 (0.5788
865444
1350
1211
1390
1384
17.2 00

0.80319
1.01
48 1914
80319
54 3814

1.91
143 — 17.2) 1.000000 (0.5814
1.61
1720
1400
1376
240
172
680
688

1.61) 143.000 (8.88
128.8
1420
1288
132

We 50 mod bri. 0 Wind to
pressed 30 lbs. 100 feet Power
to low of two inch 4 inch
plant & Grease lubricant
fertilizer, farm implements
buggy yell 4 inch 4 chain
Kiamme on 3 spotting at first
to point where plies per just be
glue to melt together

80 -100 62 x
46000 62
.8
6
.8) 62.00 (77.5
56
60
56
40

5814
17.2
11628
40698
5814
1.000008

0.58
17.2
1156
4046
58
1.8941 6

Cenne 612.5
745 10 — 1

331 30 — 4
1.76 8

135.525 331000 (2
271050
0

135725) 331000 (2

331) 135725 (4
1324

050319
96
4819914
722871
34748624 8
1.76) 135
1408

Filling Means Cin

1 Gram - 36.2 -
47.3

135.810 1.1 1.0
134.285 080319
1.525 080319
080319
1.15409

.05814
141
5814
22256
5814
8147774
680319
96
2419114
722871
14706624

52.5
17.5
350

1.523) 134.285000 88
122000
12285
12200

625
.964
2500
3750
5625
60.2500

65 - 250
42 570

22.660

280
194
478
237
3
74.2
62.6
106

23.5) 22.660000 (.964
21 15
1510
1440
1000

8.1

413) 33.5000
3304
460

Notebook, N-93-11-20

This notebook, which covers the period December 1893-April 1894, is a continuation of N-93-08-01. It was used by Joseph W. Harris for notes and calculations regarding phonograph cylinder experiments, nos. 101-486, and for instructions on the molding process. There are also notes and drawings on bricking experiments for iron ore concentrate. At the beginning of the book is a 2-page list of chemical supplies. The front cover is labeled "Experimental & Analytical Chemical Notes. J.W. Harris." The book contains 183 numbered pages. Several pages were removed before the book was paginated.

Blank pages not filmed: 4-5, 126-133.

Prices of Sundry materials

Paraffin wax	lb.	4 - 7 cts
Tallow	"	5½ "
Carnauba wax	"	10 - 17 "
Japan wax	"	8 "
Syrian asphalt	"	6 - 8 "
Cuban asphalt, hard	"	4 "
Cuban " soft	"	4½ "
Trinidad asphalt	"	1½ cts
Coal tar	"	1 ct
Coal tar pitch	"	1 ct
Coal " " Scotch	"	¾ "
Burgundy pitch	"	2½ - 3 "
Bees wax	"	25 "
Ceresin	"	11 "
Ozokerite	"	7 "
Lima Petroleum	gal.	2.75 "
Pennsylvania Petroleum	gal	
Mexican asphalt, soft	lb.	5 cts
Rosin - B -	"	0.5 "
Reg. Phonograph wax	"	16 - 20 "
Stearic Acid		10 "
Stearate of Soda		10 "
Aluminate of Soda		5.5 cts
Naphthalin, refined		5 cts
Stearate of Aluminum		12 "

Spermaceti	300 lb.
White Bayberry	13 1/2 "
Yellow Bayberry	11 "
Paraffin	6 "
Cocoa Butter	6 "
Oleic Acid	3 "
Crude Anthracene	4 "
Crude Naphthalene	3 1/2 "
Yellow Beeswax	22 "
Crude Creosote	5 gal
Wood Tar Pitch	1/2 of 1%
Scotch pitch	0.356 of 1%

Experiments for a base for Phonograph Cylinders.

#101 - 5 grams pitch, 1 gram soft mexican asphalt, 3 grams carnauba, 30 Mg NaOH not good

102 - 5 grams pitch, 2 grams soft mexican 3 grams carnauba, 30 Mg. NaOH
No good

103 5 grams pitch, 3 grams soft mexican, 3 grams carnauba, 30 Mg. NaOH
No good

104 - 3 grams pitch 4 grams soft mexican 3 grams carnauba, 30 mg NaOH
No good

105 5 grams pitch, 5 grams soft mexican 3 grams carnauba 30 Mg NaOH
good

106 - 5 grams pitch, 1 gram trinidad, 1 gram Japan wax, 30 Mg NaOH
No good

107 - 5 grams pitch, 2 grams trinidad, 1 gram Japan wax 30 Mg NaOH
No good

108 5 grams pitch, 3 grams trinidad
1 gram Japan wax, 30 Mg NaOH
No Good

109 - 5 grams pitch, 4 grams trinidad
1 gram Japan wax, 30 Mg NaOH
No Good

110 5 grams pitch, 5 grams trinidad
1 gram Japan wax, 30 mg NaOH
No Good

111 5 grams pitch, 1 gram trinidad
2 grams Japan wax, 30 Mg NaOH
No Good

112 5 grams pitch, 2 grams trinidad
2 grams Japan wax 30 mg NaOH
No Good

113 5 grams pitch 3 grams trinidad
2 grams Japan wax 30 mg NaOH
No Good

114 5 grams pitch, 4 grams trinidad
2 grams Japan wax, 30 mg NaOH
No Good

115 5 grams pitch, 5 grams trinidad
2 grams Japan wax 30 mg NaOH
No Good

116 5 grams pitch 1 gram trinidad
3 grams Japan wax, 30 mg NaOH
No Good

117 - 5 grams pitch, 2 grams trinidad
3 grams Japan wax, 30 mg NaOH
No Good

118 5 grams pitch, 3 grams trinidad
3 grams Japan wax, 30 mg NaOH
No Good

119 - 5 grams pitch, 4 grams trinidad
3 grams Japan wax, 30 mg NaOH
No Good

120 5 grams pitch, 5 grams trinidad
3 grams Japan wax, 30 mg NaOH
No Good

121 5 grams pitch, 1 gram soft mexican
1 gram Japan wax, 30 mg NaOH

122 5 grams pitch, 2 grams soft mexican
1 gram Japan wax 30 mg NaOH

123 5 grams pitch 3 grams soft mexican
1 gram Japan wax 30 mg NaOH

124 5 grams pitch 4 grams soft mexican
1 gram Japan wax 30 mg NaOH

125 5 grams pitch, 5 grams soft mexican
1 gram Japan wax, 30 mg NaOH

126 - 5 grams pitch, 1 gram rosin, 1 gram Carnauba, 20 mg NaOH

127 - 5 grams pitch, 2 grams rosin, 1 gram carnauba, 20 mg NaOH

128 - 5 grams pitch, 3 grams rosin, 1 gram carnauba, 20 mg NaOH

129 - 5 grams pitch, 4 grams rosin, 1 gram carnauba, 20 mg NaOH

130 - 5 grams pitch, 5 grams rosin, 1 gram carnauba, 20 mg NaOH

131 - 5 grams pitch, 1 gram rosin, 2 grams carnauba, 20 mg NaOH

132 - 5 grams pitch, 2 grams rosin, 2 grams carnauba, 20 mg NaOH

133 - 5 grams pitch, 3 grams rosin, 2 grams carnauba, 20 mg NaOH

134 - 5 grams pitch, 4 grams rosin, 2 grams carnauba, 20 mg NaOH

135 - 5 grams pitch, 5 grams rosin, 2 grams carnauba.

Stock made from HS7 -
HS7ia
5 grams tinnitus, 3 grams pitch
3 grams cornauba, 30 mg NaOH

125 grams tinnitus, 75 grams
coal tar pitch, 75 grams cornauba
wax, 750 mg. NaOH.

This is poured in mould
with hollow core & can
to be chilled quickly, or
wax will stick very tight
to it. I poured water in
the core to cool it.
Used cottonseed oil to grease
moulds, it proves to be
soluble in the molten wax.
Must use an oil insoluble
in the asphalt.

In moulding these cylinders,
use cold moulds and cold cores.
Wet place wet rag around mould.
Remove inner core as soon as wax

is sufficiently cooled, as the contraction
will be so great as to render
it impossible to do so. Let
cylinder cool in outer mould.
Wet rags can be placed on mould
after core is removed, if desired;
it will hasten cooling. Cylinder
is easily removed from mould
when cool. Will fall out.
Use castor oil.

To coat regular wax around the
base here would harm cylinder
+ core cold. Pour in regular wax
very hot, this will have the effect
of softening the base enough to run
together and the hot mould will
keep the wax sufficiently fluid to
make a good cylinder. After a few
minutes, the mould can be cooled
by a wet rag, and removed when
cool.
A "compound" or "double" cylinder
was left in the air during a
cold rainy + windy night, it did
not seem to be injured any the
next morning.

Experiments on emulsions for a waterproofing, using rosin as a base.

136 – Rosin, little Na_2O, no good

137 – Rosin, little Na_2O, little pitch, no good

138, Rosin, little Na_2O, little pitch, little carnauba, no good

139, Rosin, little Na_2O, little pitch, little stearic acid, no good.

140 Rosin, little Na_2O, little pitch little Japan wax, no good

141, Rosin, little Na_2O, little trinidad, no good.

142, Rosin, Na_2O, Trinidad, Carnauba, no good

143, Rosin, Na_2O, Soft Mexican asphalt no good

144, Rosin, Na_2O, Syrian asphalt – no good

145, Rosin, Na_2O, Stearate of Soda no good

146, Rosin, Na_2O, Stearate of Alumina, no good

147 – Rosin, Na_2O, Naphthalin no good

148, Rosin, Na_2O, Stearate of Soda, Carnauba wax no good

149, Rosin, Na_2O, Stearate of Soda, Carnauba, Japan wax no good

150 Rosin, Na2O, Stearate of Soda
Stearate of Aluminum
no good

151 60 Trinidad, + 1/2 gram Na2O,
40 Japan wax,
no good 4.1 cts per lb

152 75 Trinidad
25 Carnauba + 100 mg. Na2O
no good 4 cts per lb

153 - 5 parts #151
5 " Reg wax
fair 10 cts per lb

154 6 parts #151
4 " Reg wax
fair 9 cts lb

155 7 parts 151
3 " Reg wax
no good

156 - 8 parts #151
2 " Reg wax
no good

157 9 parts 151
1 " Reg wax
no good

158 - 5 parts #152
5 " Reg wax
good 10 cts per lb

159 6 parts 152
4 " Reg wax
good 8.8 cts per lb

160 7 parts 152
3 " Reg wax
good 7.6 cts per lb

161 8 parts 152
2 " Reg wax
good 6.4 cts per lb

162 9 parts 152
1 " Reg wax
good 5.2 cts per lb

163 – 5 parts 151
3 " Stearate of Soda
no good

164 – 6 parts 151
4 " Stearate of Soda
no good

165 – 7 parts 151
3 " Stearate of Soda
no good

166 8 parts 151
2 " Stearate of Soda
no good

167 – 9 parts 151
1 " Stearate of Soda
no good

168 5 parts 152
5 parts Stearate of Soda
good 7 cts per lb

169 6 parts 152
4 " Stearate of Soda
no good

170 – 7 parts 152
3 " Stearate of Soda
good 5.8 cts

171 – 8 parts 152
2 " Stearate of Soda
good 5.2 cts

172 9 parts 152
1 " Stearate of Soda
good 4.6 cts

173 5 parts 152
3 " Japan wax
no good

174 6 " 152
4 " Japan wax
no good

175 7 " 152
3 " Japan wax
no good

176 8 " 152
2 " Japan wax
no good

177 9 " 152
1 " Japan wax
fair 4.4 cts

178 – 60 grams Trinidad
0.5 " No. 20
fair 2.1 cts. lb.

179 – 9.5 grams 178
0.5 " Japan wax
no good

180 9 grams 178
1 " Japan wax
no good

181 8.5 " 178
1.5 " Japan wax
no good

182 8 grams 178
2 " Japan wax
no good

183 7.5 " 178
2.5 " Japan wax
no good

184 9 grams 178
1 " Ozokerite
good 2.6 cts lb

185 – 8 grams 178
2 " Ozokerite
fair 3.1 cts lb

186 7 grams 178
3 " Ozokerite
good 3.52 cts lb

187 6 grams 178
4 " Ozokerite
no good

188 5 grams 178
5 " Ozokerite
no good

189 4 grams 178
6 grams Ozokerite
no good

190 3 grams 178
7 grams Ozokerite
no good

191 9 grams 178
~~47.5~~ 1 " Soft Mexican
~~47.5~~ good 2.4 cts lb

192, 8 grams 178
2 " Soft American
no gel

193 7 " 178
3 " Soft American
no gel

194 6 " 178
4 " Soft American
no gel

195 5 " 178
5 " Soft American
fair 3.15 ctc lb

196 – 8 " 178
220.5 – 1 " Cannauba
27.5 – 1 " Stearate of Soda
good 3.7 ctc lb

197 – 7 " 178
1 " Cannauba
2 " Stearate of Soda
fair 4.5 ctc lb

198 – 6 grams 178
1 " Cannauba
3 " Stearate of Soda
fair 5.26 ctc lb

199 5 " 178
1 " Cannauba
4 " Stearate of Soda
fair 6.1 ctc lb

200 – 7 " 178
192.5 – 2 " Cannauba
55 – 1 " Stearate of Soda
27.5 – 1 good 4.5 ctc lb

201 – 6 " 178
165 – 2 " Cannauba
55 – 7 " Stearate of Soda
55 good 5.2 ctc lb

202 5 " 178
2 " Cannauba
3 " Stearate of Soda
fair 6.1 ctc lb

203 4 " 178
2 " Cannauba
4 " Stearate of Soda
fair 6.94 ctc lb

204 — 3 grams 178
82.5 — 2 " Camanda
550 — 7 " Stearate of Soda
1370.5 — 5 " good 7.6 cts lb

205 — 6 " 178
165 — 3 " Camanda
825 — 1 " Stearate of Soda
275 good 5.12 cts lb

206 — 5 " 178
3 " Camanda
2 " Stearate of Soda
fair 6.1 cts lb

207 — 4 " 178
3 " Camanda
3 " Stearate of Soda
no good

208 — 3 " 178
3 " Camanda
4 " Stearate of Soda
no good

209 — 2 " 178
3 " Camanda
5 " Stearate of Soda
no good

210 — 9 grams 178
1 " Camanda
no good 2.8 cts lb

211 — 8 " 178
2 " Camanda
no good 3.6 cts lb

212 — 7 " 178
3 " Camanda
no good 4.4 cts lb

213 — 6 " 178
4 " Camanda
no good 5.2 cts lb

214 — 5 " 178
5 " Camanda
no good 6 cts lb

215 — 9 " 178
1 " Stearate of Soda
fair 2.8 cts lb

216 — 8 " 178
2 " Stearate of Soda
fair 3.6 cts lb

217 - 7 grams 178
3 " Stearate of Soda
no good 4.4 cts lb

218 6 " 178
4 " Stearate of Soda
no good 5.2 cts lb

219 5 " 178
5 " Stearate of Soda
fair 6 cts lb

220 9 " 178
1 " naphthalin
In this Expt. a considerable portion of the naphthalin was lost by evaporation. I do not know the proportions varied in sample.
no good 2.3 cts lb

221 9 grams 178
1 " Stearate Alumina
no good 3 cts lb

222 8 " 178
2 " Stearate of alumina
no good 4 cts lb

223 - 7 grams 178
3 " Stearate of Alumina
no good 5 cts lb

224 6 " 178
4 " Aluminum Stearate
fair 6 cts lb

225 5 " 178
5 " Aluminum Stearate
fair 7 cts lb

226 - 10 " 178
250/0.250 10 milligrams Naphthalin
possible 2 cts lb

227 10 grams 178
250/0.500 20 milligrams Naphthalin
possible 2 cts lb

228 10 grams 178
250/0.750 30 milligrams Naphthalin
possible 2 cts lb

229 10 grams 178
250/1.00 40 milligrams Naphthalin
possible 2 cts lb

230 10 grams 178
2.50 - 50 milligrams Naphthalin
possible 2 cts lb

231 5 grams 178
2.50 - 50 milligrams Naphthalin
possible 2 cts lb

232 5 grams 178
2.50 - 75 milligrams Naphthalin
possible 2.1 cts lb

233 5 grams 178
2.50 - 100 milligrams Naphthalin
possible 2.1 cts lb

234 5 grams 178
2.50 - 125 milligrams Naphthalin
6.25 possible 2.125 cts lb
(no good)

235 5 1/2 grams 178
4 " Camauba
1/2 " Japan wax
no good 5.5 cts lb

236 3 1/4 " 178
4 " Camauba
3/4 " Japan wax
no good 5 2/3 cts lb

237 5 grams 178
4 " Camauba
1 " Japan wax
no good 5.8 cts lb

238 4 3/4 grams 178
4 " Camauba
1 1/4 " Japan wax
no good 6 cts lb

239 4 1/2 grams 178
4 " Camauba
1 1/2 " Japan wax
good 6.1 cts

240 (106, 100, 44) 4 1/4 " 178
4 " Camauba
1 3/4 " Japan wax
good 6 1/4 cts lb

241 4 " 178
4 " Camauba
2 " Japan wax
no good 6.4 cts lb

242 7 Rosin
2 Carnauba
1 Stearate of Soda
no good

243 6 Rosin
2 Carnauba
2 Stearate of Soda
No Good

244 5 Rosin
2 Carnauba
3 Stearate of Soda
no good

245 7 Rosin
3 Carnauba
no good

246 6 Rosin
3 Carnauba
1 Stearate of Soda
no good

247 5 Rosin
3 Carnauba
2 Stearate of Soda
no good

248 7 Rosin
2 Stearate of Soda
1 Japan wax
no good

249 6 Rosin
3 Stearate of Soda
1 Japan wax
Good 41 Ch 4

250 5 Rosin
4 Stearate of Soda
1 Japan wax
no good

251 9 Rosin
1 Japan wax
no good

252 8 Rosin
2 Japan wax
no good

253 7 Rosin
2 Japan wax
1 Carnauba
no good

254 5 Rosin
3 Syrian Asphalt
2 Carnauba
no good

255 5 Rosin
2 Syrian
3 Carnauba
no good

256 250 grams Carnauba
1 " Soda Hydrate
10 cc

257 250 " Syrian Asphalt
1 " Soda hydrate
9 cc

258 3 grams 256
3 " 257 +
4 " Rosin
no good

259 2 " 256
3 " 257 +
5 " Rosin
no good

260 2 grams 256
2 " 257
6 " Rosin +
no good

261 2 " 256
2 " 257 +
2 " Stearate of Soda
2 " " " Alumina
2 " Rosin
no good

262 2 " 256
3 " 257 +
3 " Rosin
2 " Stearate of Soda
no good

263 2 " 256
3 " 257 +
3 " Rosin
2 " Stearate Alumina
no good

264 6 Rosin
2 256
1 Gum Arabic +
1 257
no good

265 - 6 Rosin
2 Lead Carbonate
2 256 +
no good

266 6 Rosin
2 Lead Carbonate
2 257 +
no good

267 - 6 Rosin
2 257 +
2 Bay nut
no good

268 6 Rosin
2 256
1 257 +
1 Lead Nitrate
no good

269 6 - Rosin
1 - Litharge
2 - 256
1 - 257 +
no good

270 9 Rosin
1 Extract Logwood
no good

271 9 Rosin
1 Sumac
fair

272 9 Rosin
1 Euphorbium
no good

273 9 Rosin
1 Gum Kino
no good

274 9 Rosin
1 Gum Lac
no good

275 9 Rosin
1 Blood Albumen
no good

276 8 - Rosin
1 - Gum Arabic
1 - 156 +
no good

277 – 8 Rosin
1 Gum Mastic +
1 256
no good

278 8 Rosin
1 Gum Kauri +
1 256
no good

279 8 Rosin
1 Gum Amalgum +
1 256
no good

280 8 Rosin
1 Gum Guaiacum +
1 256
no good

281 7 Rosin
1 Hard tar pitch +
2 256
no good

282 9 Rosin
1 Catechu
no good

283 8 Rosin
1 Gum Thus +
1 256
for bulk

284 8 Rosin
2 Gelatine
no good

285 8 Rosin
1 Shellac
1 Japan wax
no good

286 8 Rosin
1 Gum Gotham
1 Japan wax
no good

287 8 Rosin
1 Burnt Umber +
1 256
no good

288 8 Rosin
2 Acetate Manganese
no good

289 7 Rosin
2 Japan Wax
1 2156
no good

290 7 Rosin
2 Japan Wax
1 257
no good

291 7 Ros
1 Japan Wax
2 256
too sticky

292 7 Rosin
1 Japan wax
2 257
no good

293 8 Rosin
1 Japan Wax
2 256
too sticky

294 8 Rosin
1 Japan wax
1 257
too sticky

295 6 Rosin
2 Japan wax
2 Stearate Soda
too soft

296 6 Rosin
1 Japan wax
3 Stearate Soda
fair too sticky

297 6 Rosin
3 Japan wax
1 Stearate Aluminum
no good

298 6 Rosin
2 Japan wax
2 Stearate Aluminum
too sticky

299 6 Rosin
1 Japan wax
3 Stearate Aluminum
too sticky

300 7 Rosin
2 Japan Wax
1 Rag Phase wax
no good

301 7 Room
3 Rag wax
good 5.3 ctr lb

302 8 Room
2 Rag wax
too sticky

303 9 Room
1 Rag wax
not good

304 8 Room
1 Japan wax
1 Rag wax
not good

305 7 Room
1 Japan wax
2 Rag wax
no good

306 6 Room
1 Japan wax
3 Rag wax
no good 5.9 ctr lb

307 7 Room
1 Rag wax
1 Japan wax
1 256
no good 3.73 ctr lb

308 7 Room
1 Rag wax
1 Japan wax
1 257
no good 3.65 ctr lb

309 6 Room
1 Rag wax
2 Japan wax
1 256
no good 4.5 ctr lb

310 6 Room
2 Rag wax
1 Japan wax
1 256
no good 5.3 ctr lb

311 6 Room
1 Rag wax
1 Japan wax
2 256 4.7 ctr lb
no good

312 6 Rosin
1 Rog way
1 Japan way
1 257
no good 5.2 cts

313 6 Rosin
1 Rog way
2 Japan way
1 257
no good 4.4 cts

314 6 Rosin
1 Rog way
1 Japan way
2 257
no good 4.5 cts

315 6 Rosin
1 Japan way
3 Stearate Lido
2 256
no good 6.1 cts Cl.

316 6 Rosin
2 Japan way
2 Stearate Lido
2-256
no good 5.9 cts

317 -7 Rosin
2 Bay way
1 Spermaceti
no good 9.35 cts

318 7 Rosin
1 Crude Anthracen
1 Bay way
1 Spermaceti
no good 6.75 cts

319 6 Rosin
2 Bay way
2 Anthracen
no good 7.1 cts

320 5 Rosin
3 Bay way
2-257
no good 11 cts

321 5 Rosin
3 Bay way
2 256
no good 11.25 cts

3.22 - 6 Resin
2 Stearate of Soda
1 Japan wax
1 Stearate Aluminum
no good 4.3 cts

3.2 3 150-6 Resin
30-1 Stearate Soda
60-2 Stearate Aluminum
30-1 Japan wax
good 4.5 ct

3.24 6 Resin
3 Stearate Aluminum
1 Japan wax
no good 4.7 cts

3.25 6 Resin
2 Stearate Soda
2 Stearate Aluminum
1 Japan wax
no good 5.45 cts

3.26 150-5 Resin
90-3 Stearate Soda
30 1 Stearate Aluminum
30-1 Japan wax
no good 5.25 cts

3.27 150-5 Resin
30 1 Stearate Soda
90 3 Stearate Aluminum
30 1 Japan wax
no good 5.65 cts

3.28 5 Resin
4 Stearate Soda
1 Japan wax
no good 5.05 cts

3.29 150-5 Resin
120 4 Stearate Aluminum
30 1 Japan wax
good 5.85 cts

3.30 180 6 Resin
90 3 Reg wax
30 1 256
good 6.1 cts

3.31 5 Resin
3 Reg wax
2 256
no good 7.05 cts

332 5 - 256
5 - 257
no good 9.5 cts

333 4 - 256
4 - 257
2 - Rosin
no good 8.9 cts

334 3 - 256
3 - 257
[illegible]
no good 5.9 cts

335 3 256
4 257
3 Rosin
no good 6.75 cts

336 4 256
3 257
3 Rosin
no good 6.85 cts

337 2 - 257
3 - 256
5 Rosin
no good 5.05 cts

338 7 Rosin
2 1/2 256
1/2 Bay wax
no good 4.35 cts

339 7 Rosin
2 1/2 256
1/2 Spermaceti
no good 4.35 cts

340 210 7 Rosin
60 2 256
15 1/2 Spermaceti
15 1/2 Bay wax
good 5.35 cts

341 7 Rosin
2 Crude Anthracen
1/2 Spermaceti
1/2 Bay wax
no good 4.15 cts

342 7 Rosin
2 1/2 Crude Anthracen
1/2 Bay wax
no good 2.85 cts

343 7 Rosin
2 Crude Anthracen
1 Spermaceti
no good 4.15 cts

344 7 Rosin
2 Crude Anthracen
1 Bay wax
no good 4.15 cts

345 7 Rosin
1/2 Crude Anth
1/2 Spermaceti
no good 2.85 cts

346 5 Crude Anthracen
2 - 256
1 Rosin
no good 4.15 cts

347 6 Crude Anthracen
2 256
2 Rosin
no good 4.5 cts

348 7 Crude Anthracen
2 256
1 Rosin
no good 4.85 cts

349 5 Crude Anthracen
1 Reg wax
2 Rosin
1 Stearate of Soda
1 " " Alumina
no good 5.9 cts

350 5 Crude Anthracen
2 Rosin
2 Stearate Soda
1 Spermaceti
no good 7.1 cts

351 6 1/2 Rosin
2 Reg wax
1/2 Japan wax
1 257
no good 4.8 cts

352 250 grams Carnauba wax
1/2 " Na2O
750 " Syrian asphalt
at 8.5 cts lb

353 9 grams 352
" Rosin
negord

354 8 " 352
2 " Rosin
negord

355 7 " 352
3 " Rosin
negord

356 6 " 352
4 " Rosin
negord

357 5 " 352
5 " Rosin
negord

358 4 " 352
6 " Rosin
negord

359 3 " 352
7 " Rosin
negord

360 9 grams 352
1 " Trinidad refiled
negord

361 8 " 352
2 " Trinidad
negord

362 7 " 352
3 " Trinidad
negord

363 6 " 352
4 " Trinidad
negord

364 5 " 352
5 " Trinidad
negord

365 4 " 352
6 " Trinidad
negord

366 3 " 352
7 " Trinidad
negord

367 9 grams 352
1 " Cocoa Butter
no good

368 8 " 352
2 " Cocoa Butter
p.

369 7 " 352
3 " Cocoa Butter
no good

370 6 " 352
4 " Cocoa Butter
no good

371 5 " 352
5 " Cocoa Butter
no good

372 9 " 352
1 " Crude Anthracen
no good

373 8 " 352
2 " Anthracen
no good

374 7 grams 352
3 " Anthracen
no good

375 6 " 352
4 " Anthracen
no good

376 5 " 352
5 " Anthracen
no good

377 4 " 352
6 " Anthracen
no good

378 3 " 352
7 " Anthracen
no good

379 9 " 352
1 6 Japan wax
good

380 8 " 352
2 " Japan wax
fair

381 7 grams 352
3 " Japan wax

382 6 " 352
4 " Japan wax
no good

383 5 " 352
5 " Japan wax

384 4 " 352
6 " Japan wax
no good

385 9 " 352
1 " yellow beeswax
no good

386 8 " 352
2 " yellow beeswax
no good

387 7 " 352
3 " beeswax

388 6 - 352
4 - beeswax

389 5 " 352
5 " beeswax

390 9 " 352
1 " flowers of Sulphur
no good

391 9 " 352
1 " Ozokerite
no good

392 8 " 352
2 " Ozokerite
no good

393 7 " 352
3 " Ozokerite
no good

394 6 " 352
4 " Ozokerite

395 5 Parts 352
5 " Azobenzite

396 4 " 352
6 " Azobenzite

397 3 " 352
7 " Azobenzite
no good

398 2 " 352
8 " Azobenzite
no good

399 1 " 352
9 " Azobenzite
no good

400 9 - 352
1 Naphthalin

401 8 - 352
2 Naphthalin

402 9 - 352
1 - Soft Mexican Asphalt
no good

403 8 - 352
2 - Soft Mexican

404 7 - 352
3 - Soft Mexican

405 6 - 352
4 Soft Mexican
no good

406 9 - 352 1
1 Sumac

407 8 - 352
2 - Sumac

408 7 - 352
3 - Sumac
no good

409 - 6 - 352
4 - Sumac
no good

410 - 5 - 352
5 - Sumac
no good

411 9 - 352
1 Stearic of Soda

412 8 352
2 Stearic of Soda
no good

413 7 - 352
3 - Stearate of Soda

414 6 - 352
4 - Stearate of Soda
no good

415 5 - 352
5 - Stearate of Soda

416 9 - 352
1 - Crude Paraffin

417 8 - 352
2 - Paraffin

418 7 - 352
3 - Paraffin

419 6 - 352
4 - Paraffin

420 5 - 352
5 - Paraffin

421 9 - 352
1 - Sodium Aluminate
no good

422 8 - 352
2 Sodium Aluminate

423 7 - 352
3 - Sodium Aluminate
no good

424 6 - 352
4 - Sodium Aluminate
no good

425 5 - 352
5 Sodium aluminate
no good

426 9 - 352
1 - Stearate of Aluminum
no good

427 8 - 352
2 - Stearate of Aluminum

428 7 - 352
3 - Aluminum Stearate

429 6 - 352
4 - Aluminum Stearate

430 5 - 352
5 Aluminum Stearate

431 9 Rosin
1 Crude Paraffin
to much Rosin

432 ^{200}-8 Rosin
^{50}-2 Crude Paraffin
very good but electrical
but scratches

433 ^{175}-7 Rosin
^{175}-3 Crude Paraffin
good, hard, not electrical, but
scratches

434 ^{150}-6 Rosin
^{100}-4 Crude Paraffin
good, hard, not electrical
but scratches

435 ^{125}-5 Rosin
^{125}-5 Crude Paraffin
good

436 9 Trinidad asphalt
1 Crude Paraffin

437 8 Trinidad
2 Crude Paraffin

438 7 Trinidad
3 Crude Paraffin

439 6 Trinidad
4 Crude Paraffin

440 5 Trinidad
5 Crude Paraffin
no good

441 7 - Rosin
2 - Crude Paraffin
1 - Carnauba,

442 - 7 - Rosin
2 - Crude Paraffin
1 - 256

443 - 7 Rosin
2 - Crude Paraffin,
1 - Syrian,

444 7 - Rosin,
2 - Crude Paraffin
1 - 257

445 150 - 6 Rosin
75 - 3 Crude Paraffin,
25 1 - 256

446 150 6 Rosin
75 - 3 Crude Paraffin,
25 1 - Carnauba,

447 150 - 6 - Rosin
75 3 Crude Paraffin,
25 1 257

448 150 6 Rosin,
75 3 Crude Paraffin
25 1 - Syrian. paid
Cerotic acid 5 cts a lb

449 150 6 Rosin
50 2 Paraffin
75 1 Co 256
75 1 Stearat of Soda
Mogul

450 150 6 Rosin
50 2 Paraffin
50 2 Stearate of Soda

451 150 6 Rosin
50 2 Paraffin
50 2 256

452 125 5 Rosin
50 2 Paraffin
75 3 256

453 125 5 Rosin
50 2 Paraffin
50 2 256
25 1 Stearate of Soda

454 125 5 Rosin
50 2 Paraffin
25 1 256
50 2 Stearate of Soda

455 125 5 Rosin
50 2 Paraffin
75 3 Stearat of Soda

456 125 5 Rosin
125 75 Paraffin
50 2 Syrian asphalt

457 125 5 Rosin
50 2 Paraffin
75 3 Syrian asphalt

458 100 4 Rosin
75 3 Paraffin
75 3 Syrian Asphalt

459 100-4 Resin
50-2 Paraffin
10-1 Syrian Asphalt

460 [illegible]
[illegible]

461 200-8 Resin
25-1 Paraffin
25-1 Palm Oil

462 175-7 Resin
50-2 Paraffin
25-1 Palm Oil

463 90-6 Resin
45-3 Paraffin
15-1 Palm Oil

464 90-6 Resin
15-1 Paraffin
15-1 Stearate Soda
15-1 Syrian Asphalt

465 75-5 Resin
30-2 Paraffin
15-1 Stearate Soda
15-1 Syrian Asphalt

466 75-5 Resin
30-2 Paraffin
7½-1½ Stearate Soda
22½-4½ Syrian Asphalt

467 125-125 Resin
50-100 Paraffin
12½-25 Syrian

468 125-125 Resin
53.75-107½ Paraffin
18.75-37½ Syrian
no Gum

469 95-5 Resin
60-4 Syrian
15-1 Paraffin
no Gum

470 { 250 carnauba 9.2 cts lb
1 NaOH
175 Syrian asphalt

471 { 150 Rosin
75 Paraffin
25 Syrian asphalt

472 20 1 gram 470
80 4 " 471

473 10 1 " 470
90 9 " 471

474 30 3 " 470
70 7 " 471

475 40 4 " 470
60 6 " 471

476 50 5 " 470
50 5 " 471

477 duplicate of 473
gots lb 5.88 grams saponified carnauba
8 " " 13.12 " Syrian asphalt
4 " " 27.00 " Paraffin
½ " " 54.00 " Rosin
100.00
cost 3.47 cts lb.

478 6 saponified carnauba
13 Syrian asphalt
27 Paraffin
54 Rosin
cost 3.47 cts lb.
The saponified carnauba is made by melting 250 parts carnauba and adding 1 part sodium hydrate.

479 5 saponified Carnauba
15 Syrian Asphalt
30 Paraffin
50 Rosin

480 7 Saponified Carnauba
10 Syrian Asphalt
30 Paraffin
53 Rosin

481 7 calcined Canauba
12 syrian asphalt
25 paraffine
56 resin, good
only a trifling scratch after two months standing in air.

482 5 calcined Canauba
12 syrian asphalt
20 paraffine
60 resin

483 5 calcined Canauba
15 syrian asphalt
20 paraffin
57 resin

484 5½ canauba
7½ soda
13 syrian asphalt
27 paraffine
54 resin

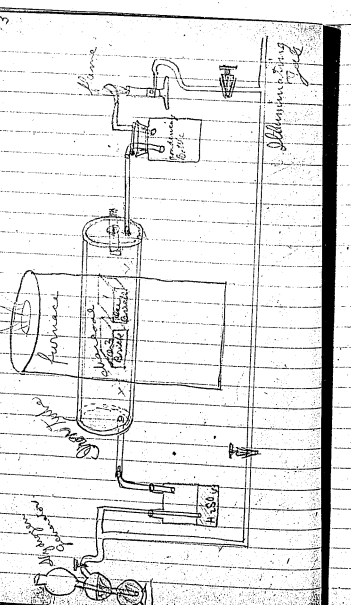
Continued on page 125

Dec 27th 1893

Some brisked regular Edison Ogden Concentrate were surrounded with crushed charcoal and placed in an iron tube, to be reduced to metallic iron. The air from the tube was displaced by coal gas (illuminating gas) and this by hydrogen. The H. was washed by H_2SO_4, and a condensing bottle was placed at the end of the tube, to collect the water formed by the action of the hydrogen on the hot ore.

Furnace started at 1.40 P.M.
" stopped " 5.55
Two briks in tube, Time 4¼ hours
#1 weighed 427 grams before reducing
#2 " 435 " " "
#1 " 332 " after "
#2 " 326 " " "
Briks were so placed that #2 would be reduced first.
(Diagram of apparatus on next page)
Temperature exp'd a low white heat, probably 1800° to 2000°?

Diagram of apparatus used to reduce the bricks Dec 27-1893



Illuminating gas was allowed to pass through the hot tube until the tube and contents had become cold, the bricks removed the following morning.

On examining the bricks it was found that they had either warped, or the temperature had been so great that they softened, and the reduced part expanded more than the unreduced side.

The bricks were only reduced on one side.

Assuming the oxide brick to contain 65% iron, it should have lost 24.8% oxygen.

#1 brick lost 95 grams, should have lost 106 grams to have been completely reduced, or about 110 grams, allowing for petroleum gas etc.

#2 brick lost 109 grams, should have lost 108 grams of oxygen showing that it is almost completely reduced, after allowing for petroleum etc.

Dec 28th 1893

Expt of Dec 27 with bricks of one repeated using larger size charcoal, no fine stuff, so as to allow a free circulation of hydrogen gas.
Two bricks placed in ~~one~~ tube, #3 + #4.
Furnace started at 1.10 PM.
" stopped " "
#3 brick weighed 406 grams before heating
#4 " " 469 " " " "
#3 " " " after " "
#4 " " " " " "
Bricks so placed that #3 will be reduced first.
Bricks were laid horizontally as in first expt.
At 2.45 it was discovered that the iron tube had been burned through + furnace was shut off.

Dec 30th 1893

Expt made with two unbaked bricks, the idea being to bake them in an atmosphere of H, + then reduce them at the same time.
These bricks were made with 4 lbs of a mixture of 2 lbs rosin, 1 lb lima petroleum.
The condensing tube became full of a dark brown colored gas or vapor, which burned with a yellow smoky flame.
Furnace started at 1.40 PM.
Temp, orange heat probably 1400° - 1500° ?
Furnace stopped at 5.40 PM + bricks cooled in an atmosphere of illuminating gas.
When removed Dec 31st it was found that the bricks had cracked in small pieces and crumbled easily. This may have been due to having been heated to rapidly.
Time 4 hours

Jan 2nd 1894

Same under all [illegible]
baked in charcoal [illegible]
on [illegible]
Two of the bricks were [illegible]
in [illegible] the [illegible]
[illegible] the [illegible] C.O. and
[illegible] in [illegible]
Furnace started at 5:30 PM.
[illegible] yellow heat.
Furnace stopped at 3:45
Hydrogen passed until [illegible]
[illegible] and then
illuminating gas passed until
[illegible] cooled.
On removing it was found
that neither brick had been
much injured the horizontal
brick was beginning to crack
across the middle and the
horizontal bricks had already
cracked
Time 1 1/4 hours

Jan 3rd 1894

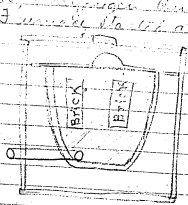
Two bricks baked in charcoal
were placed horizontally in
the iron tube and ~~[illegible]~~
illuminating gas passed until
air had been expelled then
hydrogen passed, & heated to
about 2000°F.
Furnace started at 1:15 PM.
At 3:00 it was noticed that about
a dozen [illegible] flames of
hydrogen were burning on
surface of the tube in the furnace.
These bricks will probably crack up
in cooling, and the tube will have
to be rejected after experiment is
ended.
Color of furnace very bright yellow.
Furnace stopped at 5:45 and
bricks cooled off in an atmosphere
of illuminating gas.
On removing after cooling, it was
found the bricks had cracked.
Time 4 1/2 hours

Dec. 4th 1894

Tube removed, and two bricks placed in a graphite crucible, [illegible] in tube passed [illegible] hydrogen. The bricks were surrounded with charcoal.

Air was shut off & hydrogen then admitted.

Furnace started at 2:00 P.M.



Time 3 3/4 hours

The Hydrogen gas was washed with H_2O & dried via $CaCl_2$ tube.

Furnace stopped at 5.45 P.M.

On removing the bricks, it was found that the iron had sweated out of the bricks, they had been heated to high, were very "Little".

Temp. low white heat 2000°F – 2200°F.

Jan 5th 1893

Two bricks reduced in crucible with hydrogen as spoken of.

Furnace started at 1.30.

Temp. Bright red, pistol 1900°-1500°

Orange heat

Furnace stopped at 6:00 P.M.

Hydrogen passed off cold.

On removing the bricks they appeared to be perfectly reduced, [illegible] on breaking them the [illegible] found to be coated [illegible]

Mr. Edison says the temp. is to high.

On trying the [illegible] on an [illegible] bulb they left behind a small metallic [illegible] in color. I think the temp. is set right, but the bricks were not heated long enough, nor the hydrogen passed long enough.

Time 4 1/2 hours

Jan [illegible]

The bricks placed in muffle well covered with Large Charcoal reduced with hydrogen as usual

Furnace started at 2.00 P.M.

Temp Red hot. about 900°-1000° F.

Furnace shut down at 6.00 P.M.

Illuminating gas passed until 6 P.M.

When bricks were removed they were found reduced ~~Oxidized~~ quickly on the bend and had every appearance of being burned.

Time 4 hours

These bricks were made with Lime + Rosin mush, 45 lbs per ton, baked to 500° F for 1 hour, in charcoal

Jan 9th

The bricks placed in muffle well covered with Large Charcoal reduced with hydrogen as usual

Furnace started at 10.00 A.M.

Temp bright red to dull range.

Furnace shut down at 6.00 P.M.

Illuminating gas kept passing through all night.

On removing the bricks next morning they had not been reduced quickly ~~oxidized~~

Time 8 hours.

These bricks were made with Lime + Rosin mush, 45 lbs per ton — Baked to 500° F for 1 hour, in charcoal

Jan 10th 1904

Two sound bricks placed in crucible and covered with charcoal, the charcoal was placed so as to cause a very fine flame around the bricks, which the top of a small piece of crucible had an abundance of charcoal, as well as a free oxidation furnace closed at 9.05 AM.
Temp Bright Orange probably 1400-1500°F
Furnace opened 6.00 P.M.
Bricks stiff yet passed till cold.
On removing bricks, found they were not reduced, but had cracked into a number of pieces.

Jan 11th

Two sound bricks put bottom muffle with Lime Oil + Resin and had been fired in charcoal and a half of large Corsan Sludge acid bricks that had not been fired in charcoal but in graphite crucible & well covered with charcoal & heated to yellow heat, probably 1800°F
furnace closed at 9.45 AM.
furnace opened at 6.00 P.M.
Bricks cooled off in furnace.
On removing bricks, found that they had not reduced, but had cracked up considerable
There was no difference in the appearance of the sludge acid & Rosin bricks

Jan 12th 1892

Two round brick placed in iron tube surrounded with charcoal, all placed in a tube behind furnace.
Furnace started at 10.30 am.
Temp. Change not probably 12 m - 1 pm
Furnace shut down at 6.00 PM.
On unwrapping the bricks they had not been reduced, but had cracked in several places.

Jan 13th 1892

Two round rein bricks and ½ of a large sludge acid brick placed in tube, surrounded with charcoal.
Furnace started at 9.30 AM.
Temp. Fair according to Pyling.
Furnace stopped at 4.30 P.M.
Cooled with Hydrogen to prevent oxidation.
Bricks removed Monday, had partially reduced to a minimum, which, they had all cracked a little, what this is due to, I am not understand, unless it is some mechanical method which beating exactly such a pressure that the bricks crack.

Jan 18th 1894

3 pound sample Lupis placed in tube, in a hot drill [illegible] Oxygen. In [illegible] hydrogen passed. Furnace slowly up to 1 P.M. [illegible] At 3 P.M. furnace [illegible] high heat, [illegible] the particles of iron together. [illegible] Hydrogen. When reduced it was found that the tube had not reduced in the part which rested on the metal of the boat

Jan 16th 1893

Tubular [illegible] in boat [illegible] (5–1½ meals) placed [illegible] Hydrogen can [illegible] boat.

Furnace started at 12:00 A.M.

Temp. Orange yellow

[illegible] Hydrogen + then [illegible] eliminating [illegible] passed through [illegible] it was found that the boat had been thoroughly reduced and had partially oxidized again

Jan 18th

[illegible] Heat well [illegible] well [illegible]
Furnace started at 7.30 Am
Temp. [illegible]
Furnace stopped at 1.00 PM
Fire 3 [illegible]
[illegible]
[illegible] 2 P.M.
[illegible] every
[illegible] the [illegible]
[illegible] happens
[illegible] had [illegible] and
[illegible] required to do the work.

Jan 19th 1894

[illegible] bar [illegible]
[illegible]
Furnace started at 9.45 - PM.
Temp. [illegible] well [illegible] 1220
[illegible] to prevent bricks from
[illegible]
Temp. Change
Furnace stopped at 5.00 PM
Called in [illegible]
[illegible] they have been
[illegible] and not [illegible]
[illegible] together

Jan 20th 1894

Placed one brick in heat surrounded with less than 16 meal charcoal, & passed by dragon as usual

Furnace started 9.15 AM.

Temp. very bright yellow.

Furnace stopped at 3.00 P.M.

Brick cooled in hydrogen

When removed it was seen that the particles had not melted together altho, but was thus prepared.

Jan 22 - 1894

Placed 1 brick in heat but did not surround it with charcoal as it seems as if it melts together better if it is not so covered.

H_2SO_4 bass sp. g. of 1.79, which seems to cube. Heavy rapid, it was abs. into the chamber [illegible]

Furnace started at 10.00 AM

Temp. Yellow heat.

Stopped at 2.00 P.M.

Cooled in H. gas.

When removed, it was reduced all over, and on sawing in half was reduced all through

Jan 24th 1894

Placed 3 bricks on crucible, not surrounded with charcoal, but charcoal lumps placed at each end of boat.
Started Furnace 9:00 AM.
started slowly, to try to prevent trip from ordering.
Stopped at 12:00 M.
Started at 1:00 PM.
Stopped at 4:15 PM.
Temp. Bright yellow.
Total Time 6¼ hours.
Cooled in Hydrogen.
Bricks had not been thoroughly reduced, more charcoal added placed in tube again.

Jan 25th 1894

Same bricks as Jan 24th
Heated again.
Furnace started gradually, at 9:30 AM.
Final Temp. Yellow hot.
Furnace stopped at 2:45 the tube had been burned through
When tube was cold bricks were removed were thoroughly reduced on the outside but treating one stand not thoroughly reduced were inclined to minimize conditions

Jan 26th 1894

Made an expt with a thermo electric couple using plate Cu O + C separated by a piece of fire brick. Elements were placed in a bath of melted Na_2CO_3 ammonia process, + E.M.F. + Amperes taken.

Volts - -.05 to +.075
Amp - 0.01 mp. - 2 mp
Amp - 0.02 2 mp / 1 cu 3 mp - 0.1 nordc
Amp - 0.03 1 mp 3 mp nordc
Amp - 0.02 - 2 mp 3 mp nordc

A gas is given off at the carbon electrode

Amp 20 c.c.
30 " "
40 " "
30 " "

Duplicate expt with fused lead.

Amps 3.5 amps. 50 volts
" 4 "
" 5 "
6 "
7 "

Electrodes between 5-7

Amps 35 ma a
40 " "
50 " "
60 " "
70 " "

Expt repeated with a mixture equal parts of Na_2SO_4 & Na_2O fused.

In immersing electrodes,
Amperes 4.0 ma 0 volts
in glass 3 minutes 60 " 0 "
fused mass frothed and
liquid on which electrodes
were immersed, on removing
it subsided. Action at it
was again at a quiet rate,
electrodes were again immersed.
On again immersing
Amps. 2.0 ma 0 volts

Expt. repeated with Na_2O fused

1180 m.a. no ppts.
1400 - 1450 ma " " Cl
750 " " " " "
solution pitched & filled on electrodes removed.

1.45 amp.

This expt repeated with a resistance of 0.25 ohm in series with amperemeter -
amps. with res. 80 ma
" without res. 116 - 100
" with res 90 -
" " 130
without " 140
" 120
with " 100

Expt with NaCl
without res 15 m.a.
with " 10 " "

Sodium Nitrate

with res 1 mgr.
without " 3 " c.

Phosphate of Soda

with res
without res.

Phosphate could not be found.

Chloride of Soda
without res. see amp.
with " " "

Resinophate of Soda
with res
without res

Combines with iron pan
& melts easily & bottom falls
out

Magnesia Sulphate
insoluble

Magnesia Chloride,
decomposes. Hot zinc chloride
solid remains.

Bi Cadmate of Potash
could get no reading
no milli Amperes, deflection
the table.

Chloride of Calcium

decomposes, given off HCl

[illegible] gave to potato & [illegible]

Boracic Acid

[illegible] as [illegible] that it could not be [illegible]

Hyposulphite Soda

Sulphur
Iodine
resulting compound gives no current

Sulphide of Soda

[illegible] current [illegible]

Jan 30th 1894

Test of [illegible] composed of
Sn, Pb, & solution of KI
in H_2O, 3g. KI in 12g. H_2O
Started at 11.15 A.M.
Amps at start 50 milli amps
Volts [illegible] Ckt [illegible]
Open Circuit no reading
at 11.25 87 milli amps.
" 11.40 100 " "
" 11.50 130 " "
" 12.00 160 " "
" 12.30 166 " "
" 4.10 200 " "
" 6.10 200 " "
" 8.30 Am, Jan 31st 1894 200 milli amp.

Jan 30th

Cell with 1½g KI, 1½g KOH
12g H_2O Sn + Cu.

In starting test, 3.20 PM
current 170 milli amp. in 75 Ω
in 5 minutes 3.25 " " (a glass rod broke current)
at 3.30 PM. 410 " "
" 3.50 600 " " no volts
" 4.10 900 " " "
" 6.10 1500 " " "
" 8.30 AM, Jan 31st, 100 milli amperes.

Feb. 3rd 1894

The following Illustration are assayed for Nitro.
2151, 2156, 2157, 2161, 2162, 2163, 2164, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2175, 2177.
A portion of each one was selected according to the amount of sample, so as to represent a fair average, so, were ground to 120 mesh, well mixed, and 5 grams of each mixed with No. ClO_3 fused in a porcelain crucible & Sulphur, Ground charcoal also used with the No. (ClO_3).

Experiment made to determine the cause of the regular Rosin & Lime, juice becoming thicker by further application of heat.
100 grams rosin,
50 " Lime were melted & mixed in a Enameled dish, and heated to 200°F for 1 hour, at the end of that time had lost 12 grams in weight, = 24% of Lime. In adding more lime & heating for 6 hours at 200°F, & adding sufficient lime to keep weight constant it was found that the juice had become considerably thicker after cooling than when first mixed this may be due to light particles of air having been driven off, up to the Resin having gone further into solution.

Test of rate of flow of juice
per well, hot juice.

Weight of can 10½ gs.
juice running well except that
in 15 min. 10 collected 6.5 gs.
= 26 gs per minute, well
up full, sta. 16 to 39 holes.
This is equivalent to
At 20 cts (45 lbs juice per ton)
tap open full for 1 min, 10 gs
for 100 lbs ore,
At 12.5 cts (28 lbs juice per ton)
tap open full for 46 seconds, or
open to 7.7 on index for 1 minute,
to 100 lbs ore.

1. 19 mesh crude ore ground to
powder, separated in the usual way,
a powder by carbon magnetic
this placed in a test tube in
the light reducing in tube an
an atmosphere of hydrogen, allowed
to cool in illuminating gas,
and then ground to 100 mesh,
gave 2.75 % Fe by assay mag.

Thursday 7th 1894

Some Experiments made mixing chemical lime, petroleum with kerosene, naphtha + turpentine to facilitate mixing.

#1

22 ozs lime
6 lbs lime = 2 cts
22½ " " + lime juice = 1½ cts

Mixed with cold oil.
1/3 taken + mixed with juice
Upon this mixed with balance
of oil. Mixes easy, but does
not brick well in hands

#2

Reg. 12½ cts mixed, to be used as a standard for comparison

#3

Naphtha – Sp g 0.67
Cost 3.5 cts gal = 5.36 lbs per gal
= 1.53 lbs per ct = 0.653 cts per lb

4 lbs naphtha – when added to oil seemed to be lost it did not appear to wet it at all. Did not make any apparent difference in the mixing. I think it all evaporated. When mixed, it appeared to be rather dry, but will be repeated

#4

Kerosene, Sp g 0.768
cost 3.5 cts per gal

4 lbs kerosene – when added appeared to wet it, although not much.

5

Cost of Rosin Oil.
[illegible] 6 cts gal
= 0.75 cts lb = 1.33 lbs, 1 ct

2 lbs per ton used = 1½ cts.
10 cts juice.
difficult to mix, not very good
does not brick well in bag,
feels dry.

6

Rosin oil,
4 lbs per ton 3 cts,
10 cts juice.

difficult to mix,
not so good as regular 12 oz
much off when mixed.

Notes on the use of
rosin oil in place of
petroleum to dissolve the
rosin for the juice.

1

10 grams Rosin
1 " Rosin Oil
solid when cold

2

10 grams Rosin
2 " Rosin Oil
solid when cold

3

10 grams Rosin
3 " Rosin Oil
solid when cold

4

10 grams Rosin
4 " Rosin Oil
very stiff when cold.

#5

10 grams [illegible]

[illegible]

[illegible] (K. mustard. [illegible]) Cost [illegible]

#6

10 grams Resin

6 " Resin Oil

20 " [illegible] Wax old

[illegible] Agree [illegible]

Resin Oil costs 0.75 cts lb.

Coal

Tar pitch

[illegible]

Lime

Pecina

Refined Kerosene

[illegible]

Aqua [illegible]

is partly soluble in

Turpentine

[illegible]

Made some Exists with Resin oil -

10 lbs Pitch 5 lbs Resin Oil

mead a good gas reg. mixture

15 lbs dat 1/3 cut turpentine

15 lbs Reg juice

10 lbs Pitch, 7½ lbs Resin Oil

Good

10 lbs Pitch, 10 lbs Resin Oil

Good

Brick made with 12 lbs [illegible]
& 10 lbs [illegible] 2 lbs [illegible]
& 26 lbs [illegible]
Mixed in [illegible]
[illegible] with difficulty, and in
[illegible]

Brick made with 12 lbs [illegible]
& 10 lbs [illegible] [illegible]
& 22.34 lbs [illegible]
[illegible]
hard.

Wax Cylinders, Dec. 1892 70
Jan. 15th 1893

4.5 Saponified [illegible] (2 NaOH, 1 H_2O)
15 Syrian asphalt
5 Paraffin
5 Stearate Alumina
5 Rosin
[illegible]

[illegible] 50 Rosin
25 Paraffin
25 Syrian asphalt
scratches frightfully

Mar 19th 1894

Experiments made on Pour hot rosin on Linseed Lay.

Hot rosin poured in a dry bag used for samples of oil. Rosin filtered through readily.

Hot rosin poured in a bag that had been placed in cold water for a few minutes. Then squeezed until only a small quantity of water remained in the bag.

Rosin evaporated the water, & filtered through.

Hot Rosin poured in bag that had been placed in a hot saturated sol. of Na_2CO_3, and water allowed to run off. Rosin evaporated water, Na_2CO_3 formed a crust on the fibre which closed the pores, Rosin did not filter through.

Experiment made to determine the insolubility of Regular Lime & Rosin juice, & a mixture of 1 part Lime Oil & 2 parts Wood Tar Pitch, this cooling, the insolubility of each was at the same. The Rosin & Lime juice was more sticky than the Wood Tar Pitch.

Experiments on solvents for Coal Tar Pitch

1 Creosote oil dissolves it perfectly.

2 1 Part Rosin Oil, 1 part Lime oil do not dissolve pitch, it separates on cooling.

3 Pine Oil does not dissolve it after mixing and allowing to cool it separates & pitch seems to be changed by the action of the acid in the oil.

4 3 Parts Rosin Oil & 1 Part Lime Oil dissolve Pitch, but it does not

very sticky after cooling.

5 A mixture of [illegible] weather fine & fish juice, 1/2 parts fine Oil, dissolves pitch when [illegible] cooling

6 Acid Oil from Bone works acid dissolves Pitch

7 Refined Oil f. petroleum works [illegible] dissolves pitch

8 [illegible] solubles in Red Oil & [illegible] gives a sticky mixture.

9 Wood tar Oil dissolves it & is a sticky mixture

10 Separated acid oil treated with Na_2O in solution + Pitch added + heated. The Na_2O separates sludge from the acid oil + this melts with the pitch. The same result is obtained when Dry Soda Hydrate is

heated with the acid oil. The soda seems to combine with an acid besides sludge, with this so salt is soluble, but $PaCl_2$ precipitates it as a hard substance

11 Coal Tar pitch, small quantity of creosote. This is sticky but too stiff. When supplying heat, it is not sticky.

Blue Oil, Soda, & Pitch - Pitch separates out as then as before.

13 - 1 Part Wood tar Oil, 2 Parts coal Pitch,

Mar 20th 1894

Made a poi[illegible] to try to regenerate the sludge from the coke residue of sludge acid.

A portion was ground up, thrown in water, filtered, it filtered very slowly, the ~~the~~ residue made seemed to dissolve in the water, but filt[illegible] very slowly and gave an acid reaction.

This water gives a pink with $BaCl_2$ which is not $BaSO_4$, although there may be some present.

If this acid solution be neutralized with HCl, Fe_2Cl_6 & heated or left for some time in the cold, good sticky sludge is regenerated although it is not as good as fresh sludge.

If dry coke stuff be ground with Na_2CO_3 in excess & then heated with HCl to dissolve the Na_2CO_3 & then washed, Chloroform, Benzol, toluol, turpentine & CS_2 extract sticky sludge from the residue.

This residue is soluble in strong Sulphuric Acid. None of the ordinary

[illegible] the coke sludge be boiled with lime [illegible] a very bitter [illegible] high melting point, but little when old, is produced. The lime probably takes up the free sulphuric acid, & makes fresh sludge. This [illegible] regenerate [illegible] stuff.

Wed. 26th 1894

Experiments were made to determine the flow of regular resin juice through the orifice of a cock at different temperatures. The opening in the cock was rectangular in shape, and was opened in quarters, each flow being for 10 seconds.

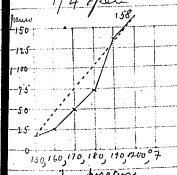
One of opening in cock,

Weights of juice in grams.

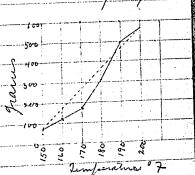
1/4		1/2		3/4		Full	
Temp.		Temp.		Temp.		Temp.	
150°F	11½	150°F	71	152°F	147	150°F	162
160	26	160	117	160	187	160	230
170	50	170	176			168	315
180	74	181	311	180	462	180	456
189½	136½	190	500	189	675	190	789
200	158	200	568	200	726	200	778

Curves with stop-cock

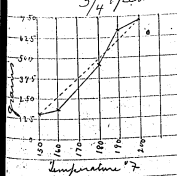
1/4 open



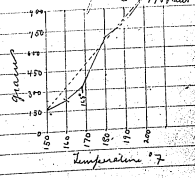
1/2 open



3/4 open



Full open



Saturday Mar 31st

Experiment in large mass
using 4 lbs of product.

100 lbs resin using
resin 12½ cts reg Resin
and
Penna Oil and 4 oz
[illegible]
[illegible] mix +
25 seconds for one to make
its appearance at about
this vessel mixed with
300 lbs of resin & Penna
through a screen.
This 200 lbs remixed with
300 lbs of resin through
again.
Then allowed to run
through again & make 4
mixes = 6 minutes.
We are now suitable
for kicking out on screen
found 59% of oil by weight
[illegible] accepted as "balls"
which had the equivalent of
juice at the rate of 500 lbs per ton

April 3rd

Experiments in this mixture
following quantities of
Resin + Penna Oil were
mixed to obtain a mixture
would be sufficient this when
cold to present "balls".

#1
Regular Mixture
100 Resin 50 Penna Oil

2
100 Resin 52½ Penna Oil

#3
100 Resin 55 Penna Oil

#4 100 Resin 57½ Penna Oil

#5
100 Resin 60 Penna Oil

#6 100 Resin 62½ Penna Oil

#7 100 Resin 65 Penna Oil

On account of the presence of

Some slides in the Pain of Mazzetti was not strictly in proportion to the 3% addition of petroleum, which would have been so, had they not been pressed

April 3rd

Experiments made with 20 lbs of one with a juice equivalent of Rosin & Pecan in the proportion of 4 – 3, at a cost of 14½ ct per lb = same quantity of rosin as in 12½ ct per juice

20 lbs are used, 2 lbs 13 oz juice used.

juice mixed with 7.5 lbs dry, run through sweet mixer, & molded in large pan, as balls,

2nd run

7.5 lbs dry are added, mixed & run as stiff, would do to slick, cut out as balls.

3rd run.

50 lbs are added, mixed & run in slab, is not stiff enough to brick after air-drying, would brick.

4th run

Total are run through, would brick, but should be balls, is better than air-dried #3

5th run

Total Run through, mixed brick made brick in hand mold in screw press, was all right, brick at a fall of 20 feet, mixed perfectly, bricks broken at 12 feet.

6th run

Run through is all right, will brick well, but is not pasty.

7th run

Total Run through, is all right is getting past, made brick in screw press, brick at 12 feet,

8th run

Run pot through, is fast, should make good bricks

April 4th

Each run is made with 25 lbs oil, 12½ cts of juice made of 4 Rosin & 3 Petroleum.

1st Run

7 cts 10 gal juice mixed with 45 lbs oil, mixed easily, no balls, is sticky

2nd run

45 lbs oil added, was a little sticky

3rd run

75 lbs oil added, oil is not sticky

4th Run

Total Run through, is not sticky, would not brick,

5th Run

Run through, is not sticky, might brick, but would not be in practice.

6th mix
the mix through is not sticky, not suitable for brick.
7th mix
the mix through is getting pasty, but is not satisfactory, would do in an emergency.
8th mix
the mix through is slightly pasty, would do.

April 5th 1894

5th mix with 12½ ounces of a mixture consisting of 1 lb 11 ozs lime & 1 lb 3½ ozs of Permanite, using ~~225~~ 225 lbs or & also quantity of juice.
juice mixed with 75 lbs or.

#1
juice mixed with 75 lbs or, put through machine, found 1 lb lime in about 2 lbs or is pasty

#2 75 lbs or added is sticky, will brick, is hard

#3 75 lbs or added, is dry not sticky, will ~~not stick~~ not brick,

#4 is wet, but not sticky will not brick.

#5
is getting sticky but is not suitable for making bricks.

#6 is pasty will brick but should be better.

#7 is pasty will brick no balls.

#8 is pasty bricks well made brick in hand mill used just as one made in brick machine in recent experiments.

7th 1894

Experiment of April 6th repeated with some results.

April 7th 1894
Experiment made with 12.5 cts of a mixture of 1 lb 11 oz soda + 1 lb 4½ oz Pennoil

1st Run
Muck mixed with 75 lbs or is sticky, no hard balls, remained soft only in a lb.
#2
75 lbs more are added - will brick not sticky, no hard balls.
#3
75 lbs are added, is dry will not brick, no balls.
#4
No balls, will brick but is not good enough, not sticky.
#5
no balls, will brick, is getting wet, but not sticky

#6
[illegible] will brick [illegible]
sufficiently sticky.
[illegible] Ellis [illegible] to dissolve
the suffer [illegible] to dry.

April 7th 1894

Expt with Brick of 1 lb 11 oz
resin & 1 lb 4½ oz Lima lime
225 lbs ore used.
1st
juice mixed with 75 lbs ore, ore
balls is pasty, but not sticky
#2
75 lbs ore added, ore is dry,
but will brick.
#3
75 lbs ore added, ore is very
dry, will not brick.
#4
Ore is getting wet, not sticky,
will brick, but not well.
#5
will brick, but poorly

#6
will brick [illegible] [illegible] better
#7
is not a little sticky, & will
brick but not well.
#8
will brick, but is not sticky
enough.

April 9th
Expt with Brick of 2 lb 2½ oz Lime
1 lb 3¼ oz Lima lime; 225 lbs ore.
1st run
juice mixed with 75 lbs ore, is
sticky, contains balls
2nd
75 lbs ore added, is good enough
to brick, contains balls
3rd run
75 lbs ore added, will not brick,
contains balls,
4th
Contains balls, will brick but dries
to better, is not dry.

5th
[illegible] Resin, [illegible] brick, and is [illegible]
6th
[illegible] good, will brick well, contains a few balls
7th good, will brick, contains few balls
8th
A very few balls, is excellent brick well in D.K.
On morning of April 10th, #8 had dried considerable, but will brick.

This corresponds to 6.77 % additional Lima, or 100 Resin, 5.3.4 Lima.

Effect on next page, 29 grs Resin, 16½ grs Lime = 13.8 % additional Lime, or 100 Resin, 56.9 Lime.

(See page 154) April 9th 1896

[illegible] with 12½ grs of 29 grs Resin, + 16½ grs Lime Chl.
1st Time
Juice mixed with 7 Slbs no, is pasty, [illegible] as many balls as with equal, but they are not hard.
2nd
7 Slbs no added, will brick, contains balls,
3rd
7 Slbs no added, will not brick, [illegible] balls, not many.
4th run,
A few balls, will brick, but should be better, does not feel sticky,
5th
A few balls, will brick, is not sticky,
6th run
A few balls, will brick, is not sticky enough
7th
very few balls, will brick, is getting pasty,
8th
practically, no balls, no is pasty enough, will brick well
On morning of April 10th, #8 is no good, it had dried up, would not brick.

April 10th 1897

Experiment with 12½ cts worth of a mixture of 28% 92 Rosin, 17 1/4 92 Lima Petroleum 1/4 pint

juice mixed with 75 lbs ore, is pretty as many balls in regular, but no hard balls.

#2

75 lbs ore added, a few balls, no hard ones, will brick.

#3

75 lbs ore added, a few soft balls, will not brick, to dry.

#4

a few balls, will brick, and so dry.

#5

a few balls, will brick, is getting sticky.

#6

practically no balls, is all right, is sticky, will brick.

#7 Practically, no balls, is sticky, will brick well

mud brick in screw press, with an inner, at a distance of 2'6" from crusher of screw, is about the same as the last bricks made in the machine, duplicate brick at a 7 foot fall.

#8

is all right, no balls, brickes well, is sticky.

This experiment corresponds to an increase of 23.86 %, say 24 % Lima Petroleum, using 12½ cents worth, with Rosin at ½ ct, & Lima at 1/3 ct per lb.

and gives the best results.

The Springs in my screw show a pressure of 20 lbs on the spring.

This equals 1½ Rosin, 6½ Lima.

April - 11th 1894

Duplicate

Experiment of page 156, with 10 lb springs in mixing, in the place of 30 lb springs.

#1

Mixed with 75 lbs ore, contains about 30% balls, they are not hard, and it appears that they are due to the springs being too light, will not brick.

#2

75 lbs ore added, will not brick, about 15% balls.

#3

75 lbs ore added, will not brick, very dry, about 10% balls.

#4

Will not brick, balls have not diminished in dry.

#5, will not brick in dry.

#6 " " " " "

#7 " " " " "

#8 " " " " same number of balls as in #3, is also very dry.

Tests of torque of small mixer with 10 lb springs

Empty.

Starting Torque, 9 lbs

Running Torque, 7.5 lbs.

Pulley has a radius of 12", gears are 5 to 1, End of spreader is 8" from center of shaft =

$9 \times 5 \times 12 \div 8 =$

$9 \times 7.5 = 67.5$ lbs starting torque

$7.5 \times 5 \times 12 \div 8 = 7.5 \times 7.5 = 56.25$ lbs running torque.

Machine with contains 225 lbs ore,

Starting torque = 55 lbs,

Running Torque 50 lbs,

$55 \times 5 \times 12 \div 8 = 55 \times 7.5 = 412.5$ lbs starting torque

$50 \times 5 \times 12 \div 8 = 50 \times 7.5 = 375$ lbs running torque.

April 12th 1900

Test of torque of small mixer with 120 springs in spring-ends.

Starting torque, 10 3/4 lbs, = 80 inch
Running torque 9 1/2 " 71.2 "

Filling mixer with 12 1/4 ozs wet Gypsum and of 28 1/2 Rosin
17 1/4 Lime Cl = 110 Rosin, 62 Gypsum.

#1

Mixer run with 75 lbs ore, is sticky, will brick, but contains about 20% balls.

#2

75 lbs ore added, will not brick, is wet sticky, balls not diminished.

#3

75 lbs ore added, will not brick, is not sticky, balls are reducing.

#4

will brick, but should be better, balls about 5%

#5

Will brick, less balls, is pasty.

#6

Will brick, is pasty, still has balls.

#7

will brick, is pasty, balls same, mix brick 18 " 16' is O.K.

#8

is pasty will brick well, very small quantity of balls.

Torque of machine with 275 lbs ore

Starting, 55 1/2 lbs =
Running, 54 1/2 lbs =

with 175 lbs ore in machine

Starting 47 1/2 lbs =
Running 45 lbs =

April 15th 1900

Experiments made with a view of using wood tar oil in place of linseed oil.

#1

Some mixed with 12½ ozs wood tar oil (2.75 cts a gallon, sp. g. = 1.01), mixed stiff, very poor.

#2

12½ cts worth of mixture of 250 parts wood tar oil, 100 parts rosin, mixed with no wax, very pasty, a little loaded with zinc white, dry in 2 days.

#3

10 cts worth of 250 wood tar oil + 10 parts rosin mixed with no varnish, a little hard, is to good, is very pasty.

#4

8 cts worth of 250 lbs wood tar oil, 100 lbs rosin, mixed

with one, is pasty, is all right. (Mixture dried in 5 days for 1 day like W. fall of a foot on asphalt pavement.

#5

8 cts worth of 250 wood tar oil, 100 rosin mixed with no wax and very thin, dries hard, made bitty with red lead, very pasty.

#6

12½ cts worth of 100 wood tar oil + 100 wood tar pitch (wood pitch worth $2.00 per ton) varnish with linseed oil, good luck, stated for 1½ hours at 520°F.

Test of spring used in small mixer, is made of 3/16" dia. brass rod is 3 7/8" long, has 9 complete convolutions using dia. 15/16" outside diameter, 1 5/16" when placed in spreader is 3 5/16" long.

By mistake this spring was filed down from 20 lb. to 15 lb. Tension should have been 20 lb.

A fan belt was placed in spreader and fastened to spreader part in parallel to cord pulley on end of spreader as would occur in practice.

a compression of	1/8"	required	10 lb.	
" " "	1/4"	"	15 1/4 "	= 5 1/4
" " "	3/8"	"	21 1/2	6 1/4
" " "	1/2"	"	27 1/4	5 3/4
" " "	5/8"	"	34	6 3/4
" " "	3/4"	"	38	4
" " "	7/8"	"	45 1/2	7 1/2
" " "	1	"	52	6 1/2
" " "	1 1/8"	"	57 1/2	5 1/2
" " "	1 1/4"	"	63	5 1/2
" " "	1 3/8"	"	70 1/2	7 1/2
Slid at	1 13/32"	"	79 1/2	9

Average pressure for 1/8" = 6.0 lbs.

April 16th

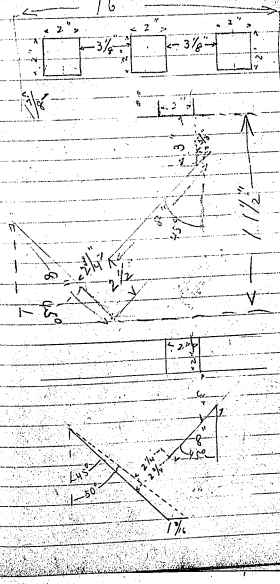
Experiment of feeding one fan [illegible]

We passed through 3 - 2" square sticks, so separated that we fell into uniform stream from second axis plot, on to screen below.

Working face of screen sticks 16" Experiment made with 50 lbs or (5 mesh) larger than 5 mesh & smaller than 1 1/2" in any direction, this being the largest size that will be put through in practice.

The following is a sketch with dimensions of the apparatus used.

The one used in this experiment is red herring, and all the 5 mesh sieved out, & no pieces larger than 1 1/4" in any direction.



Assay of New fuel at Ogden of Iron Ore, for Phosphorus.
2 grams used -
digested in aqua regia
gave yellow ppt of 1.08 mg. =
8.8/1000 % P -

April 20th -

110 Rosin, 62 Head Oil
mixed & melted. Compared
with 100 Rosin + 62 Lima. The
Lima mixture is heavy
liquid as sticky as the
Head oil mixture.

150 Rosin, 250 Stockholm Tar,
(wood tar) mixed & melted,
resulted very liquid & sticky.

made bids with each of the
above using 12½ cts. freely
assuming that Head oil &
Wood tar is the same price
as Lima Petroleum

#1
28 lbs of Head oil + Rosin, 12½ cts.
#2
33 lbs of Wood tar + Rosin, 12½ cts.

#1

3.37 grams, 4.3 grams of [illegible] Wood O.K. 62 = 12½ cts,
mixes easily, mill brick,
is not pasty, sticky,
makes brick in screw press, lay it
3 feet from cooler, warm on lay,
chipped at 32°F, 1 hour,
flow, 61.7%
OK 38.3% } bake at 7 feet on asphalt floor.

(12½ cts worth) #2
3.37 grams or, 4.8 grams of
100 K coal, 250 grams Wood Tar,
mixes fairly well, mill brick,
is not pasty nor sticky,
it feels wet,
makes brick in screw press, lay it
3 feet from cooler, warm on lay,
chipped at 32°F, 1 hour.

bake at 7 feet on asphalt floor.

Coal Tar pitch 800 lbs in 2240 lbs =
= 2.8 lbs per ct, = 0.35 cts per lb

Wood tar, at 0.33 cts per lb = 3 lbs
per ct.

A mixture of 100 lbs wood tar + 100 lbs
Blast furnace pitch, 36¼ cts = 12½ cts
do stuff

100 lbs pitch, 120 lbs Wood tar, asph

#3
100 lbs pitch, 130 lbs Wood Tar O.K.
36¼ cts = 12½ cts

It mixes a little ~~after~~ hard but
is extraordinarily good, it is darker
& harder that can be cleaned
from, 12½ cts. Chipped at 7 feet on
asphalt floor.

#4
100 lbs Scotch Pitch, 150 lbs wood tar
= 250 lbs for 84.1 cts practically
3 lbs per ct, 12½ cts, 37½ lbs
525 lbs mixture 3.37 lbs ~~[illegible]~~
mixes easily is very pasty
makes well, baked brick at 6
hours well

500 ft [illegible] Chopped at 7 feet in asphalt tests is O.K.

April 25th 1890

Wood expt with 12½ cts of Rosin + Wood oil, Proportions, 100 Rosin, 62 Wood Oil = 1.76 lbs Rosin, 1.09 lbs Oil 225 lbs tow = 18 ozs Rosin, 11 ozs Oil.

#1

Juice mixed with 75 lbs one, a small quantity of soft balls, no hard ones, is not sticky, will brick.

#2

75 lbs added, not but not sticky is doubtful if it will brick well, small number of soft balls.

#3

75 lbs one added is not wet not sticky, will not brick, practically no balls.

#4

not sticky, wet, will not brick, no balls

#5

not sticky, will not brick, no balls

#6

not sticky, wet, might brick but is not good enough, no balls.

#7

Looks dry but pasty, no balls, getting sticky.

#8 will brick, no balls, not very sticky

(Wood oil + Rosin is not as good as Linseed Oil + Rosin)

2 Potash + 2 borax bricks immersed in #1 & 2 for 15 hours, gained 0.43% in weight

#2

Experiment with 100 Rosin 250 Wood tar = 15.14 ozs Rosin 37.66 ozs wood tar 225 lbs tow = 12½ cts per 225 lbs. Wood tar + rosin mixed + heated carefully seems not to have any notable portions.

#1

Juice mixed with 75 lbs one, will brick well, very sticky, a few soft balls.

#2, 75 lbs one added, 1 soft ball, not very sticky

#3
75 lbs used for 1st lab,
not well and sticky,
#4
Sticky and sticky practically
no balls
#5 Practically no balls, is
not fine sticky, must brick,
#6 no balls will brick, is
very sticky.
#7
no balls, will brick, not very sticky
#8
no balls, will brick, is not very good.

A pungent aromatic, acid odor issues from the alumina flux, when in mixture.

Cannot be kicked, cracks like with lime.

Expl detonator will same magnesite.

It need less coolants to mud water.

Portion mixed & heat stored, kicked, baked, absorbed 0.44% in weight of water after an immersion of 15 hr.

#6
[illegible] used 1% Potash, 200 Mesh tare, 12% etc work to 22 mo [illegible]
used 1.97% [illegible] Potash, 38.5 [illegible] Mesh tare [illegible] less as [illegible]
#1
juice [illegible] used 75 lbs [illegible] balls, [illegible]
#2
75 lbs used 2% balls will [illegible] brick.
#3
75 lbs used less than 1% balls not, dust will not brick.
#4
Practically no balls, will brick should be [illegible]
#5
Practically no balls, will brick but not good enough.
#6
Practically no balls, will brick
#7
will brick, no balls
#8
no balls, should brick well.
(see next page)

made bricks in some parts all [illegible] water bins still not stick together.

Tried an experiment with 110 lb. [illegible] 135 lbs. [illegible] to stiff mortar, under bowl [illegible] sand in sac gave cement brick it.
Mixed by hand in mortar box briqued, & baked, absorbed 4.3% of water after an immersion of 15 hours.

Regular 100 Rosin 62 lime, mixed in big mixer, briqued & baked, absorbed 6.00% of water during an immersion of 15 hours.

april 18th

Experiments with small assay rolls, connected to shaker screen. Rolls were run to have a velocity of 400 surface feet per minute = 255 revolutions per min. (6" rolls) 1 lb. 14 mesh crude Ogden Ore. Time taken to run through rolls + off screen

started 9.25, off screen at 9.26½
started 9.31 " " " 9.32
" 9.35½ " " " 9.36½
" 9.40 " " " 9.40½
" 9.43 " " " 9.43½
" 9.45½ " " " 9.45¾

total time required if screen had been 100 mesh, instead of 50 mesh, 4¾ minutes. The fines + coarse were sifted through 100 mesh sieve + coarse run through rolls again + process repeated until a minimum residue of 0.5 grams remained which could not easily be ground up = 0.11% of total.
The screen has a tendency to throw on one side, is not properly constructed, should be wider + longer.

Clay from creek in Hudson 35.8%
gelatine assayed for Am-?

5 grams Hudson sediment assayed
for Cu, Ni, Co

Some of the material used as the coating
in the carbon beads with HCl to
remove any silicates which might
be in HCl imported, residue
fused with K_2CO_3, this mass
dissolved in HCl & evaporated to
dryness, redissolved in HCl & evapo-
rated to dryness to render Si insoluble
digested in HCl,
passed H_2S a sulphide ppt
imported filtered added NH_4OH
ppt of Al & Fe
Added $(NH_4)_2S$ to filtrate from this
gave no ppt even after heating & stirring
some time
Added K_2CO_3 gave copious white ppt which
looks like glutinous silica
NH_4Cl_2 gave no such ppt.

109 – 108

95 – 101

1.0496

5292 . 54

162000 1011

27 162

3.47 27.6

435 61

76 1380

109 1656

1694.0

724) 1448

3460

2896 564 8

6 5.22.4 × 27.6

427 427

24.8 332

95

5776

1708

854

106.196

5.88 13.12

9 8

5292 10496

27

162

13

627

435

24.8

3480

1740

870

107880

15-2"

16) 224 (14

16

64

2

(414

32

Hinnesota	30 cts
White Cedar	13½
Apple 4	7
Tarriff	6
Good Butter	6
Hay-Hay	
Ginger Anthracene	4
Celic Acid	3
Napthalene	3
Epson Salt	10 cts

3.14.'83

178 2.1 ~~3.2~~ 147.4

16.8 36

126 1.0 4.6 ~~4.8~~ 1/4

1.0

3.6 8 126

105 40

50 10.5 5.26

6.05 50

2.75 6.05 147

9 8.4 50 126

3475 60 4.07

6.8 ~~4~~ 3.5

65 56

275 x 3 50

6 8.25 7.6

1650 275 1375

275 6

1925 275

2200

.138 2.00

8

6.00

.54

8.5

137
250
387

46

Reg. 16
Cow 10.0

90
350

41

21.9
189
25.9

P

48
150
250

22

64
64
48

80
20.5

15.0

147
3.52

21.9
16.8
14
3.08

6
1316
8

20
180
120
48
37.0

4.1
4.0
6.4
8.6

12.3
21.9

21.9
189
25.9

~~Estimate Inclosing~~

Orange

Newfy

From

To.

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The original documents in this edition are from the archives at the Edison National Historic Site at West Orange, New Jersey.

ISBN 0-89093-702-8.

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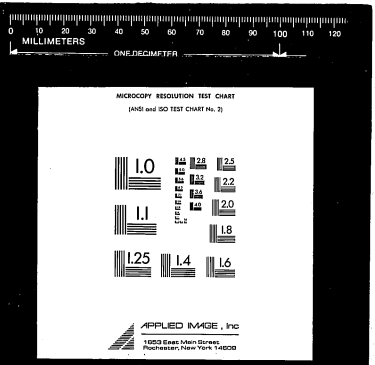

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